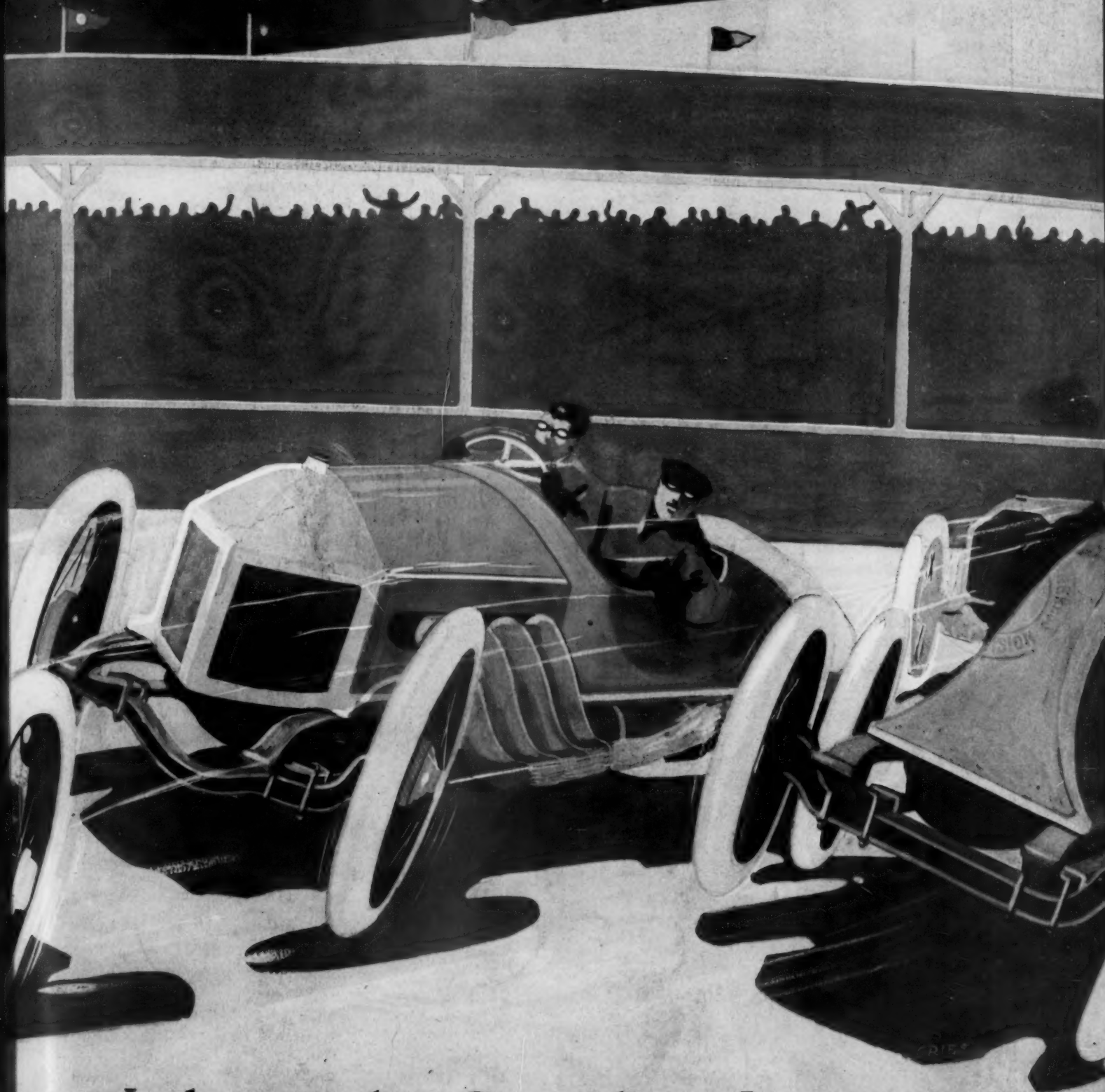


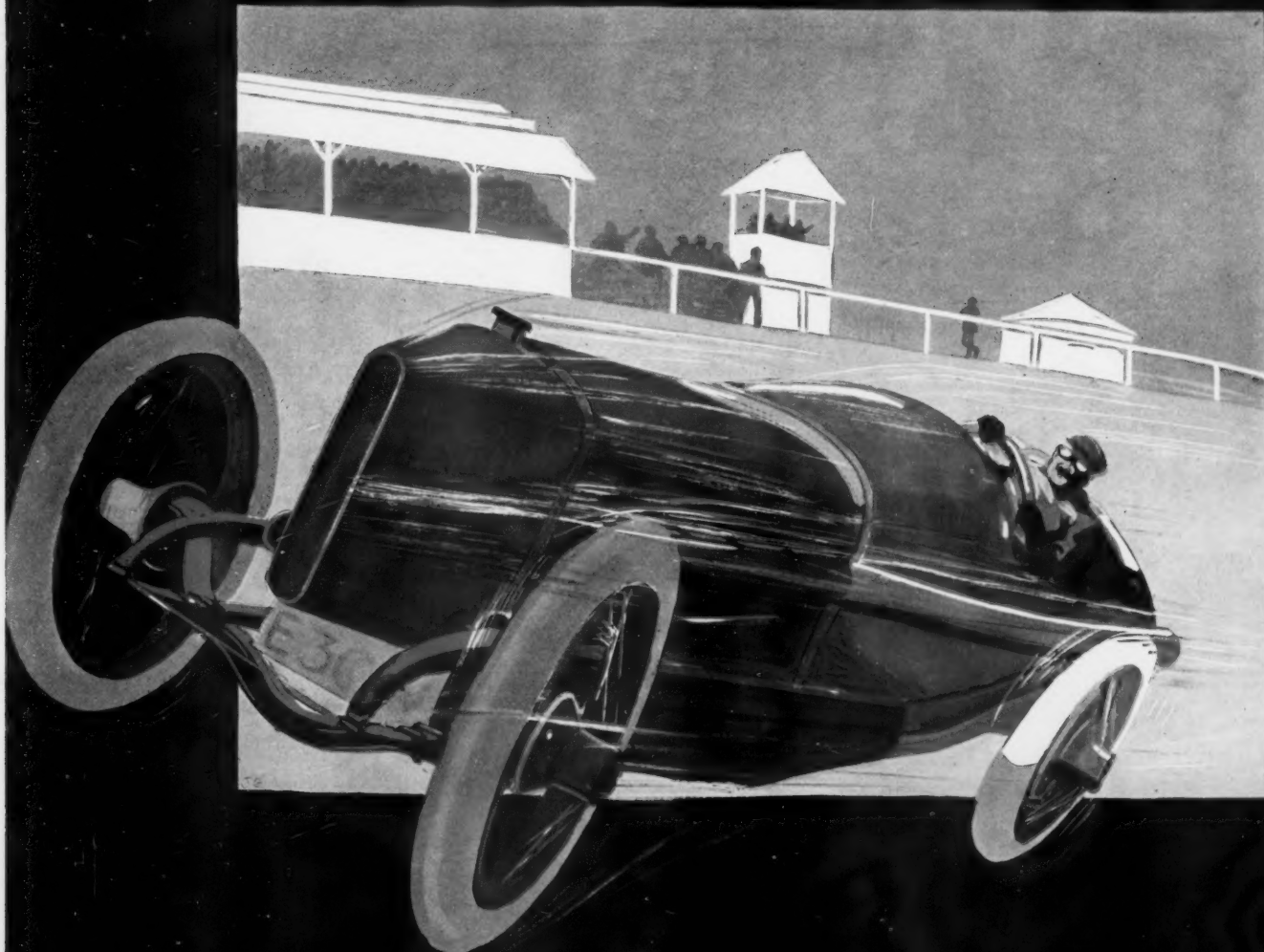
MOTOR AGE

Chicago, May 29, 1913



Indianapolis - Speedway Issue

10¢ a Copy



RUDGE-WHITWORTH

Detachable Wire Wheels

FITTED WITH

Houk ^{QUICK} DETACHABLE Rims

A Gruelling Race Has Proved a Triumph

Goux, driving a Peugeot car equipped with RUDGE-WHITWORTH WIRE WHEELS, has travelled on the Brooklands (England) Track, 106.22 miles an hour.

Think of more than a mile and three-quarters in one minute—and with practically no damage to the tires!

New world's records have been set up in the half-mile, kilometer, mile and ten laps—also held by Goux—driving the same car with RUDGE-WHITWORTH WIRE WHEELS.

For smooth riding, greater resiliency, and bigger percentage of tire mileage, nothing can equal the car equipped with RUDGE-WHITWORTH WIRE WHEELS.

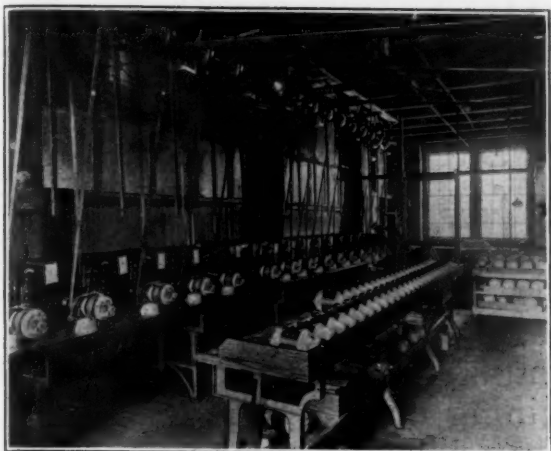
They stand up to the most exacting tests under every conceivable road condition.

American owners may now have RUDGE-WHITWORTH WIRE WHEELS equipped with Houk Quick Detachable Rims.

GEORGE W. HOUK CO.

5601 Lancaster Avenue

PHILADELPHIA, PA.



This is the factory that produces

The Noiseless North East Electric Starting and Lighting System

It is the finest and best equipped plant in the world devoted exclusively to the production of electric systems for the starting and lighting of Automobiles.

For four years we have been building electric starting and lighting systems—not so much, however, with the idea of producing in large quantities at the start, but more with the aim of turning out the highest possible quality.

We have been concentrating our efforts and our energies upon the development of our plant and of our organization, and upon the improvement of our machine.

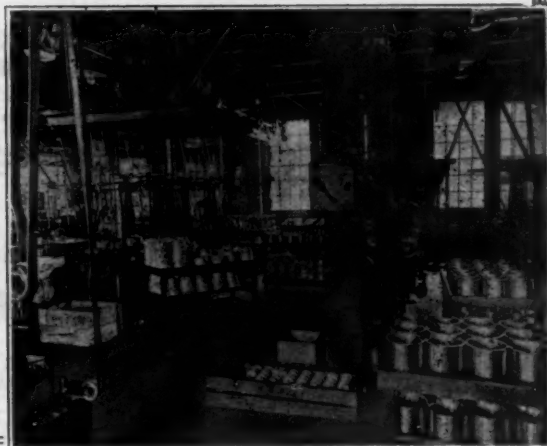
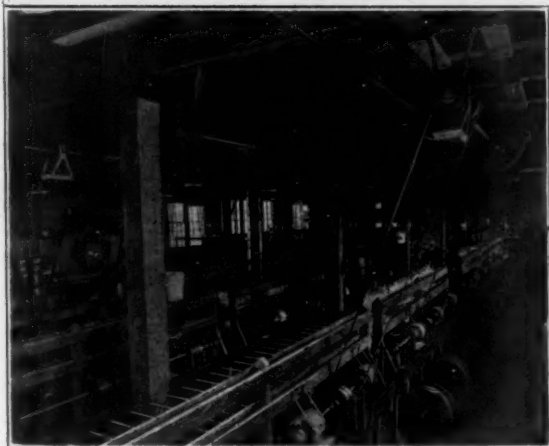


As a result of this highly developed organization and splendid equipment, the North East Electric System—a simple single motor-generator of our own creation and construction throughout—is the lightest, most compact, most flexible, most powerful and most economical electric system ever put together.

It turns the motor noiselessly, at exactly the right speed under all conditions, with a minimum of wear and tear on the battery.

The North East Electric System is now standard equipment on many of the best cars. Give us the opportunity, and we can demonstrate that the North East is the system you want on your new car.

NORTH EAST ELECTRIC CO., 33 Whitney St., Rochester, N. Y.



Automobile Makers Adopting Thin-Leaved Springs and Shock Absorbers for New Models

For many years the leading car builders both here and abroad have striven to find a better substitute for the stiff, heavy, hard-riding spring.

The effect of this type of spring has been counteracted to slight extent by the use of deeper, softer upholstery, larger tires and an increased wheel base.

But these factors, important as they are to an easy-riding car, do not secure the maximum comfort. As long as a car labors under the disadvantage of stiff, heavy springs, it is mechanically incapable of the same comfort as the car equipped with the thin-leaved spring—lately in vogue by leading manufacturers.

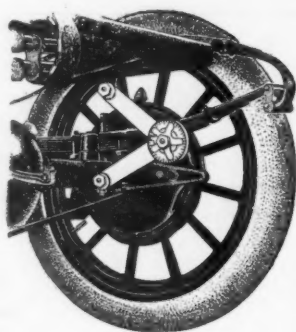
If there were any objection to the thin-leaved spring, it was due to the tendency of this type to rebound violently under the stress of rough going. This objection, however, is overcome by the employment of the Truffault-Hartford

Shock Absorber, which not only demonstrates its merit as a true restraining device, but offers sufficient reinforcement to this spring to permit its use on the heaviest car.

Both the Peerless and Hudson Companies have recently announced the use of the thin-leaved and flexible springs and many others are doing likewise.

In combination with the Truffault-Hartford Shock Absorber the thin-leaved spring makes possible a degree of riding comfort no less complete than that of riding in a palace car on a rock-ballasted railway.

Truffault-Hartford
SHOCK ABSORBER
"The Pioneer Shock Absorber"



Now used by 25 leading car manufacturers as regular equipment and an acknowledged valuable selling feature for all high-grade cars.

Catalog on request

Insist Upon Truffault-Hartfords on Your New Car

HARTFORD SUSPENSION CO.

EDWARD V. HARTFORD, Pres.

Office and Works: Jersey City, N. J.

Branch Offices and Dealers Everywhere

Manufacturers of Hartford Electric Starting and Lighting System



MOTOR AGE

Published by the
CLASS JOURNAL COMPANY
910 South Michigan Avenue
CHICAGO ILLINOIS

Volume XXIII

MAY 27, 1913

No. 22

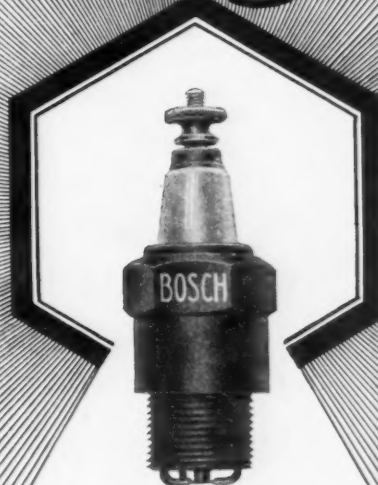
Contents

POEM—TO AMERICA'S DEFENDERS.....	5
"STARTERS READY" FOR 500-MILE RACE.....	6
Preparations for third international sweepstakes at Indianapolis	
TUNING UP FOR THE MOTOR MARATHON.....	8
Facts and figures about the cars entered at Indianapolis	
THE FOREIGNERS	12
Appearance, habits and mannerisms of European drivers entered in the 500-mile race	
DRIVERS IN 500-MILE RACE.....	14
Short illustrated sketches of the prominent pilots	
HISTORY OF INDIANAPOLIS MOTOR SPEEDWAY.....	16
Table of World's and American records	
EDITORIAL—THE SPEED COST.....	18
THE BREAKING OF RAMSEY.....	19
A story of the part superstition and fact played in the downfall of a champion	
ENGLISH ENGINEERS VISITING AMERICA.....	24
New Yorkers greet foreigners and show them American hospitality	
TARGO FLORIA A TEST OF DRIVER AND CAR.....	28
How Nazzaro won the Sicilian road-racing class over the mountain highways	
FRENCH PLANNING ROAD REFORM.....	30
Credit of nearly \$7,000,000 set aside for highway improvement	
SPECIAL LOADING ARRANGEMENTS SAVE MONEY.....	38
How one business house makes motor trucks pay	
A SIX LEADS PILOT LINE FOR 1914 SEASON.....	40
Description of a Hoosier-made car	

DEPARTMENTS

Routes and Touring Information	With Accessory Makers.....	44
Department	From the Four Winds.....	46
Readers' Clearing House.....	Coming Motoring Events.....	47
Motorists' Kindergarten	Among Makers and Dealers....	48
Manufacturers' Comment	Brief Business Announcements.	49
Motorists' Bookman	Motor Car Repair Shop.....	50

BOSCH Plugs



How Do You Buy Your Spark Plugs?

SPARK Plugs designed for profit and consequently made cheaply will prevent your motor from giving its maximum power. Even a perfect magneto cannot entirely overcome the loss in efficiency resulting from the use of improperly designed and poorly constructed plugs.

Consider very carefully the spark plugs you buy for your car or the spark plugs that come with your car. They are vital efficiency factors.

Bosch Plugs are designed not only to uphold the name they bear, but are constructed very carefully and on correct principles, the result of years of ignition investigation. Short circuits, breakage by accidental blow or by heat, compression leakage and burning away of the points, are common faults often found in spark plugs but not in Bosch Plugs.

The Peerless, Pierce-Arrow, Hudson, Mercer, Garford, Speedwell, Rambler, Fiat, Lancia and Metallurgique are examples of the class of cars that regularly equip with Bosch Plugs. You can have their equal in spark plug efficiency by insisting on Bosch.

\$1.00 EACH Bosch Plugs are sold by reputable dealers throughout the United States, or may be obtained via parcel post from Bosch Distributors, Bosch Supply Stations or any Bosch Branch.

Write today for "Locating the Spark Plug." It tells you what you ought to know about plugs and will be sent free.

Bosch Magneto Co.

214 W. 46th Street, New York

Chicago Detroit San Francisco

GRAY & DAVIS

6 Volt Electric Starter

*A Few Facts About
Its Prompt Delivery*

ON record time we are supplying to 32 different automobile manufacturers our starting and lighting system.

Our deliveries are being met promptly in accordance with all contract requirements. Every demand of the rush season is being met by our highly standardized manufacturing facilities.

Five great factories now produce Gray & Davis equipment. And to further insure the continuation of this unusually rapid service in a field otherwise somewhat unsettled **another immense Gray & Davis factory is reaching**

completion at Cambridge, Mass.

The demands of 32 automobile manufacturers were thus foreseen and completely provided for.

And motorists may rest assured that we will at all times maintain our policy of not accepting more business than we can take perfect care of.

Ours is the largest starter manufactory in the world, and our service stations are in 52 cities.

Write for illustrated catalog.

GRAY & DAVIS, Inc.

55 Landsdowne St., Boston, Mass.

GRAY & DAVIS

ELECTRIC STARTER LIGHTING DYNAMO ELECTRIC LAMPS

Gray & Davis Quality Equipment used partly or entirely by these manufacturers:

Alco
Ames
American
La France
Apperson

Chalmers
Columbia
Crawford
Flanders
Lenox

Lozier
Maritime
Maxwell
Midland
National

Norwalk
Paige
Pathfinder
Peerless
Pilot

Pope-Hartford
Pratt
Reo
B. A. Gramm's
Trucks

Seagrave
Selden
Spaulding
Stearns
Stoddard-Dayton

Tudhope
Touraine
Velle
Winton

MOTOR AGE

To America's Defenders

by J. C. Burton

*O! my sons, give heed to the gods of speed
When they call on you to-day;
There's a race to run from the starting gun
Till the bolts and nuts give way;
And the call to flight is a challenge old
From the men who dare to the men who're bold.*

Thus does the Motherland implore her sons with nerves of steel
To conquer Space in grueling race and grind Time 'neath the wheel;
Full well she knows to what rare heights her daring sons aspire,—
Projectile laws are shot with flaws before Supreme Desire.

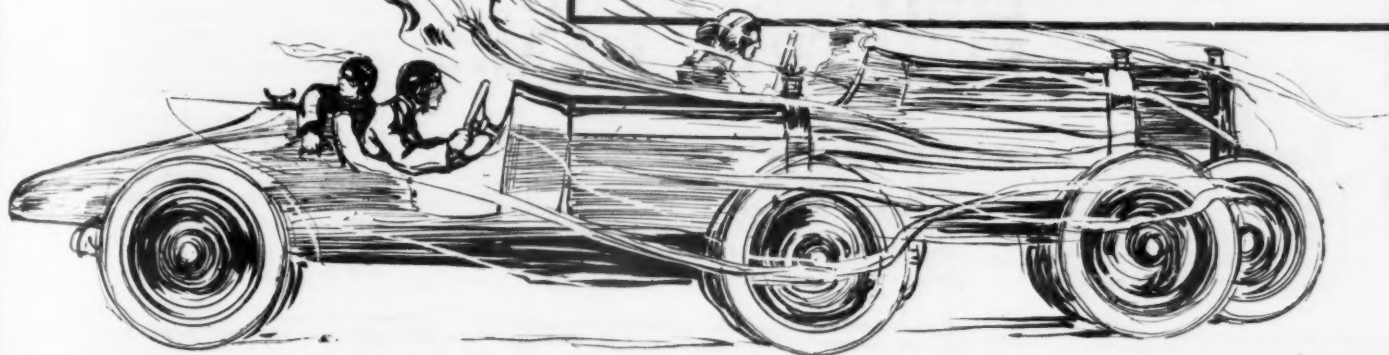
The speedway bricks glare in the sun as if flushed with your pride,
But deeds of yore are naught before to-day's Homeric ride.
Your plumed prestige is challenged now and foemen of renown
Are at the tape with eyes agape and coveting your crown.

Invaders from far foreign shores will fight you league for league;
They'll break your nerve and make you serve the master, cursed Fatigue,
Unless you meet them hood to hood and tilt them wheel to wheel,—
A man of pluck will jeer at Luck and force the Fates to kneel.

The exhausts pop impatiently and alien engines roar
A bold defi that you and I have seldom heard before;
A challenge from a land that once on paths of Progress led: *
The boasting Gaul has heard the call and yearns for vict'ry red.

The sturdy Belgian seeks the wreath which you are proud to wear—
The stake is great, he leers at Fate and mocks Death's hidden snare.
The stoic Briton, triumph-bred, by heritage is fit
To match his strength against your strength; his grit against your grit.

*O! my sons, give heed to the gods of speed,
For they call on you again;
If you give your best in this crucial test,
Then our hopes will not be vain;
And the call to flight is a challenge rare
From the men who're brave to the men who dare.*



"STARTERS READY!" for 500 mile race at Indianapolis



Paris, alternating with Lieutenant Crossman, of England, will drive the English Sunbeam. Vincenzo Trucco, who scored his last victory in 1908, when he won the Targa Florio cup, will be Italy's challenger in the Isotta. Theodore Pilette, a wealthy Belgian,

INDIANAPOLIS, May 26—America will be called upon to defend its speed laurels on Friday, ominous Friday, but America is ready, as America ever is.

On the rim of a colossal brick saucer are perched the mute cars of four nations, foreboding monsters that sound a menacing challenge when gasoline and oil course through their hardened veins. In the chaotic camps, where grimy men sweat and toil under the lash of Ambition, the champions of four nations are waiting to put the strength, stamina and strategy of America to the crucial test.

As in the misty centuries of romance when plumed knights from all over Christendom entered the lists at the tournaments and proved their skill at feats of arms, at riding and at tilting, so foreign invader and American defender will match courage and cunning Memorial day on the Indianapolis motor speedway. Chivalry will be born again when the starting bomb sounds at 10 o'clock in the morning and the contestants in the third annual international sweepstakes are sent away on their perilous journey of 500 miles.

Course Ready for Race

The modern field of honor is a track of vitrified brick, 2½ miles in circumference and glaring red in the dying rays of a May sun. The modern knights are combatants of taut nerve and stout heart who ride on roaring steeds of tireless steel. The modern joust is a motor car race for the speed supremacy of the world.

The challengers from the old world are daring. The guardians of America's honors are determined. The prize is rich. The gods of speed will have reason to rejoice when the checkered flag of victory drops and a new speedway champion is crowned.

For the first time in the history of the motor marathon, the speed struggle will be truly international. In the two previous races foreign cars have been pitted against the space-eating creations of the American engineer and designer, but not until this year have alien drivers been tempted to enter the lists and challenge the supremacy of the stars of the new world.

Eight Are Foreigners

Eight of the twenty-nine listed starters are foreign machines. They represent four nations—France, England, Italy and Germany. Five of these imported mounts will be toolled by swarthy-skinned aliens. Jules Goux, holder of the 1-hour record, and Paul Zuccarelli, a veteran of many European races, will be at the wheels of the French Peugeots. Albert Guyot, of

will defend the proud name of Germany and pursue the prize money in the Mercedes-Knight as the entry of E. C. Patterson, of Chicago.

This is the formidable foreign quintet that the American drivers will meet in the most spectacular speed battle ever waged in this country.

In order that the triumph may be distinctively American, Ralph Mulford, winner of the 1911 Vanderbilt cup classic, who will drive a Mercedes in Friday's contest; Teddy Tetzlaff, holder of the world's road racing record, and Harry Grant, twice hailed as a Vanderbilt cup victor, must be humbled. Tetzlaff and Grant will be teammates of Trucco and guide the fleet Isottas around the brick oval.

America's Defenders

America has called upon its champions of track and road to silence the challenge of the invaders and force the foreigners to bow in submission. The following defendants have responded: Ralph de Palma, Caleb Bragg and Spencer Wishart, the Mercer trio; Gil Anderson, Don Herr and Charley Merz, Indianapolis' native sons, who will drive the Stutz entries; Bob Evans, Willie Haupt and Jack Tower, of the Mason team; Harry Endicott, who has switched his allegiance from the Mason to the Nyberg; Bob Burman, master of the green Keeton; Billy Knipper, who has groomed the Henderson for a victorious debut; Howard Wilcox, who places his reliance in the Fox Special; Billy Liesaw, with the orange and black Anel; Johnny Jenkins, who will tool the Schacht; Louis Disbrow, Bill Endicott and Joe Nikrent, the three Case musketeers; George Clark, the daring Texas boy who will tame the

THE ENTRY LIST

No.	Car	Driver
1	Stutz	H. Endicott
2	Stutz	Merz
3	Stutz	Anderson
4	Keeton	Burman
5	Mason	Evans
6	Mason	Tower
7	Deltal	Dawson
8	Stutz	Herr
9	Sunbeam	Guyot
10	Henderson	Knipper
12	Fox Special	Wilcox
13	Peugeot	Zuccarelli
14	Peugeot	Goux
17	Anel	Liesaw
18	Schacht	Jenkins
19	Mercer	Bragg
21	Mercer	DePalma
22	Mercer	Wishart
23	Mercedes-Knight	Pilette
24	Pennebaker	Pennebaker
26	Tulsa	Clark
27	Isotta	Grant
28	Isotta	Tetzlaff
29	Mercedes	Trucco
31	Case	Mulford
32	Case	Disbrow
33	Case	Nikrent
35	Mason	W. Endicott
		Haupt

Tulsa; R. H. Pennebaker, the amateur sportsman who has built a special car for this race, and Joe Dawson, who has been given the mount on the Deltal.

Here is a galaxy of stars that will force the invading drivers to show their best in order to win. They will meet the invaders hood to hood and wheel to wheel. They have the advantage in that they know the track better than the aliens, who have had but 10 days in which to learn how to take the turns with the minimum loss of time and least wear of rubber.

That the 1912 record of 78.72 miles an hour, established by Joe Dawson, will be shattered is the prediction of officials, drivers and speed fans. As the National driver broke Harroun's record of 74 miles an hour, so the victor in the 1913 contest is expected to eclipse the mark of the bashful Dawson.

De Palma's Fast Century

After watching the cars in practice, it is evident that such a prediction will be verified. Laps have been reeled off at a speed man should not dare. In testing out tires de Palma covered 100 miles at an average of 85 miles an hour last week, and Burman, Bill Endicott, Goux, Knipper and the Stutz trio have threatened that mark in shorter drives.

Indianapolis racing fans have picked a favorite. The Stutz team is the choice of the Hoosiers. Such a selection is not only actuated by civic pride and superstition but based on practice performances and general conditions as well. The Stutz is a consistent performer. Its stamina has been thoroughly proven in two previous races on the speedway, and at Elgin and Milwaukee last year. The Stutz drivers, Herr, Anderson and Merz, know every brick of the 3,500,000 that compose the surface of the 2½-mile oval. They have studied the turns and know where to go into them and at what rate of speed. Their cars have been built especially for this race.

Tuesday's Time Trials

Indianapolis, Ind., May 27—The qualifying time trials on the speedway began at 1 o'clock today, and of the nine cars that made the trials all qualified in the first trial. The trials will be continued tomorrow, beginning at 10 o'clock. Caleb Bragg in No. 19 Mercer special made the best time of the trials, making the qualifying circuit at 87.5 miles per hour, his time for the lap by the Stewart electric timer being 1:42.86. Second time went to the foreigners, Zuccarelli putting No. 15 Peugeot around at an 86-mile clip, his time being 1:44.86. The times of all who took their trials today are:

No.	Car	Driver	Time	M.P.H.
19	Mercer	Caleb Bragg	1:42.86	87.5
15	Peugeot	Zuccarelli	1:44.86	86
2	Stutz	Merz	1:46.56	84.5
8	Stutz	Herr	1:48.67	82.5
3	Stutz	Anderson	1:48.92	82
5	Mason spec.	Evans	1:49.75	82
1	Nyberg	H. Endicott	1:57.88	76.5
18	Schacht	Jenkins	1:58.48	76
23	Mercedes	Pilette	1:59.17	75.5

The close running of the three Stutz

cars proved one of the sensations of the speed trials to date.

Joe Dawson, winner of last year's 500-mile race, arranged today to drive the

THE PRIZE LIST

Division of Prize Money:	
First Prize	\$20,000.00
Second Prize	10,000.00
Third Prize	5,000.00
Fourth Prize	3,500.00
Fifth Prize	3,000.00
Sixth Prize	2,200.00
Seventh Prize	1,800.00
Eighth Prize	1,600.00
Ninth Prize	1,500.00
Tenth Prize	1,400.00

ACCESSORY PRIZES.

Remy trophy and brassard, to leader at end of 200 miles, (\$50 for 20 weeks to driver if car is Remy-equipped.
 Prest-O-Lite trophy to leader at end of 300 miles.
 Wheeler-Schebler trophy to leader at end of 400 miles. (\$1,000 cash to driver if car is Schebler-equipped.)
 Rayfield trophy and \$1,000 to winner if Rayfield-equipped.
 Duff carbureter, \$500 to winner, if Duff-equipped.
 Bosch magneto, \$1,000 to winner, if Bosch-equipped.
 Hartford shock absorbers, \$500 split three ways, if Hartford-equipped.
 Red Head spark plugs, \$1,000 split three ways, if Red Head-equipped.
 Miller carbureter, \$1,000 to winner if Miller-equipped.



NEW STAND HOLDING JUDGES, TIMERS AND PRESS

Deltal, which reached the track this morning.

The three Isotta racers reached headquarters this afternoon and will be out at practice early tomorrow. They are all alike and made a favorable impression on arrival. They use stream-line bodies.

Opinions generally agree that the record hung up on Friday will be a little higher than that of last year. There was a very cool rain this morning which has cooled the track so that even if tomorrow and Thursday are hot the bricks will not be as warm as they were a year ago, a fact which should do its part to keep tire troubles down during the long grind. Today the cars have shown themselves to be faster in the qualifying trials than a year ago, in spite of the fact that the piston displacement has been cut from 600 cubic inches to 450.

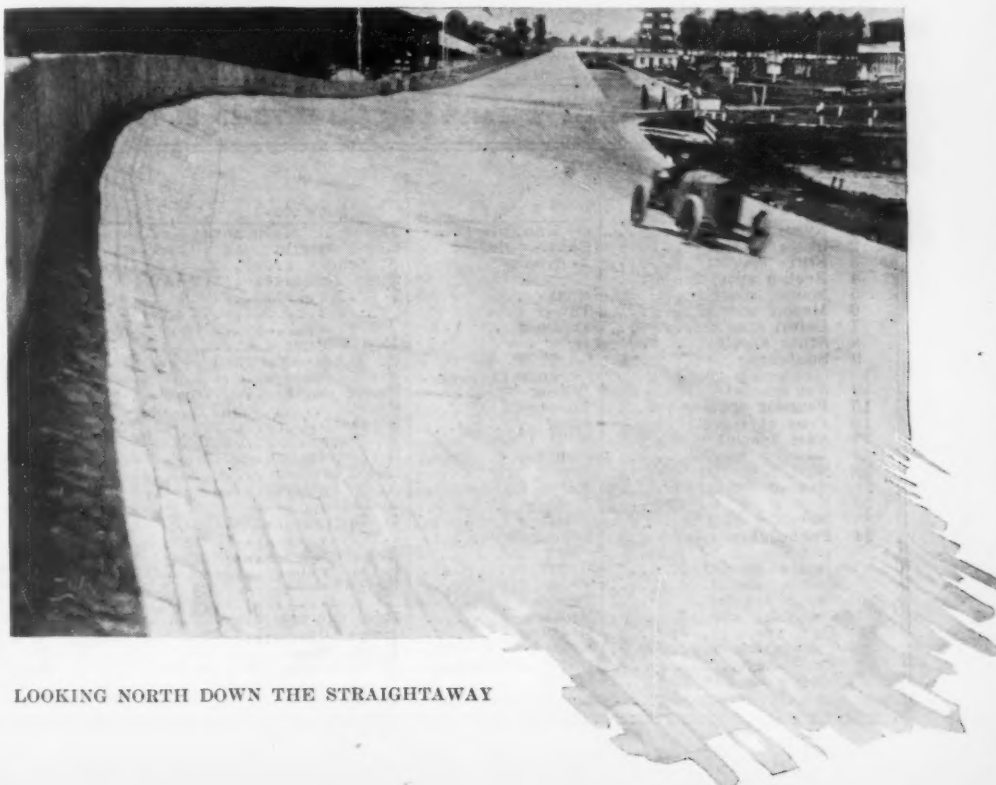
Hard to Pick Winner

Owing to the very little practice done on the speedway by many of the cars, it is almost impossible to pick the winners. It is a certainty that the fastest cars will not necessarily be winners. Several who have been following practice carefully look for a long drawn out fight between the Mercer and Stutz entries, as their drivers are very familiar with the track and the cars are equal to any demands which will be placed upon them.

Wednesday's Qualification Trials

Indianapolis, Ind., May 28—Six more entrants in the International Sweepstakes race qualified at the Speedway today. The following times were made:

No.	Car	Driver	Time	M.P.H.
6	Mason, Tower		1:42.00	88.2
33	Case, Endicott		1:45.02	85.7
22	Mercer, Wishart		1:49.77	82.8
12	Fox, Wilcox		1:50.40	81.4
25	Mason, Haupt		1:51.50	80.8
25	Tulsa, Clark		1:58.57	75.9



LOOKING NORTH DOWN THE STRAIGHTAWAY



TYPICAL TRAINING CAMP AT SPEEDWAY—THE CASE GARAGE

Tuning Up the Cars for the Memorial Day Motor Marathon

MEMORIAL day's motor marathon has drawn from across the sea a fleet of speed destroyers, the cream of Europe's racing creations, cars which have gone over 100 miles in 60 minutes. To contend with them America has assembled her finest. The Peugeots have proven their speediness on Brooklands track and the Sunbeam and the Isottas have shown that from the point of fleetness alone, they can push the swiftest of the American cars to the limit.

They are to be piloted by drivers of daring and nerve. Against their fleetness and daring the Yankees offer sturdiness of construction, cool management and above all a knowledge of the requirements of the track. The latter advantage is a most important one for through their acquaintance with the local conditions,

By Darwin S. Hatch

they have developed cars that stand the pounding of the brick pavement and the tearing swing of the slightly banked track. They have learned how to balance the car and how to distribute the weights of the various parts to reduce skidding and bouncing and thus have decreased the number of stops for tires.

Present Varied Array

In general appearance the iron steeds which will line up for the starter's word next Friday will present a varied array. This variation is mostly due to the different ideas as to methods of lessening wind resistance and the ways these have been worked out. The foreign cars in particular are noticeable for their novel shapes. The most unique in appearance is the

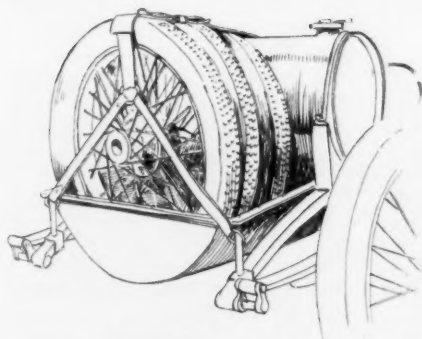
English Sunbeam. It is very long in wheelbase with long pointed snout and tail resembling very much an overgrown cigar on wheels. Among the American cars as well, there has been much done in approaching the so-called stream-line body by which the car is retarded least by the air. The high speed has made it necessary for steel shields which throw the wind over the driver's head. Burman's Keeton and Harry Endicott's Nyberg have shields of this sort which protect the pilot, but allow the mechanic to face the wind.

Car Quality a Factor

If car quality is any criterion of a race meet, the race will be the most closely fought battle of speed kings America has witnessed. In spite of the fact that motors are smaller this year than

DETAILS OF CARS ENTERED IN THIRD ANNUAL INTERNATIONAL SWEEPSTAKES MAY 30, AT

No.	Car	Driver	Mechanic	No. Cyl.	Inches Bore	St'ke	Cu.In. Displ.	Cyl. Cast	Magneto	No. Plugs	Dis-tributors No.
1	Nyberg special	H. Endicott	James B. McNamara	6	4.000	5.000	376.95	Prs.	Splitdorf	12	12
2	Stutz special	Charles Merz	Harry Martin	4	4.813	5.500	399.97	Prs.	Bosch	8	8
3	Stutz special	Anderson	F. Agan	4	4.813	5.500	399.97	Prs.	Bosch	8	8
4	Keeton special	Burman	Tony Jeannette	4	5.094	5.500	448.72	Prs.	Remy	8	8
5	Mason special	Evans		4	4.316	6.000	350.50	Blk.	Splitdorf	8	8
6	Mason special	Tower		4	4.316	6.000	350.50	Blk.	Splitdorf	8	8
7	Deltal special	Dawson		4	4.000	5.313	267.20	Blk.	Bosch	8	8
8	Stutz special	Herr	Roy Vernon	4	4.813	5.500	399.97	Prs.	Bosch	8	8
9	Sunbeam	Guyot	R. F. L. Crossman	6	3.540	6.290	367.52	Prs.	Bosch	6	1
10	Henderson special	Knipper	Frank Jones	4	4.316	6.000	350.50	Blk.	Bosch	8	8
12	Fox special	Wilcox	Frank Farber	4	4.750	5.500	389.90	Prs.	Bosch	8	8
15	Peugeot special	Zuccarelli	Fanelli	4	4.255	7.875	447.92	Blk.	Bosch	4	1
16	Peugeot special	Goux	Begin	4	4.256	7.875	448.13	Blk.	Bosch	4	1
17	Anel special	R. C. Liesaw	W. Farr	4	4.500	5.000	318.10	Prs.	Remy	4	1
18	Schacht special	Jenkins	G. Sweetman	4	4.000	5.313	299.00	Blk.	Mea	4	1
19	Mercer special	Bragg	Roy Thatcher	4	4.800	6.189	424.36	Prs.	Bosch	8	8
21	Mercer special	Ralph de Palma	Andy Volman	4	4.800	6.189	424.36	Prs.	Bosch	8	8
22	Mercer special	Wishart	J. Jenter	4	4.370	5.000	299.70	Prs.	Bosch	8	8
23	Mercedes-Knight	Pilette	B. Bruyere	4	3.937	5.118	251.33	Prs.	Bosch	4	1
24	Pennabaker special	Pennabaker		4	5.126	5.375	443.50	Prs.	Bosch	4	1
25	Tulsa	Clark	Bob Moore	4	4.752	5.500	340.10	Prs.	Bosch	8	8
26	Isotta special	Grant		4	4.600	6.000	443.86	Prs.	Bosch	8	8
27	Isotta special	T. Tetzlaff	Dave Lewis	4	4.600	6.000	443.86	Prs.	Bosch	8	8
28	Isotta special	Trucco		4	4.600	6.000	443.86	Prs.	Bosch	8	8
29	Mercedes special	Mulford	Paul Stevens	4	4.489	7.087	448.66	Prs.	Bosch	8	8
31	Case special	Disbrow	Jess Callahan	4	5.100	5.500	449.00	Prs.	Undecided	8	8
32	Case special	Nikrent	Fred Horey	4	5.100	5.500	449.00	Prs.	Undecided	8	8
33	Case special	Bill Endicott	C. R. Newhouse	6	4.359	5.000	448.00	Prs.	Undecided	12	12
35	Mason special	Haupt		4	4.316	6.000	350.50	Blk.	Splitdorf	8	8



GOUX CARRIES FOUR SPARE WHEELS AT THE REAR OF HIS PEUGEOT

formerly has been the rule at the speedway on account of the piston displacement limitation of 450 cubic inches, it is a safe prediction that a faster pace will be set than ever before.

Not alone are the cars lighter, which to an extent makes up for the difference in cylinder dimensions, but judging from construction and design the engines will develop more power in proportion to their cylinder volume, and more of that power will be used in turning the rear wheels around. Unless indications are at fault, there are going to be fewer stops for tire changes and the cars are going to run longer without halting for fresh supplies of fuel and oil. High engine speeds are the rule; such speeds as 2,800 and 2,900 revolutions per minute is the common talk among the rail birds and in the racing camps.

New Engine Designs

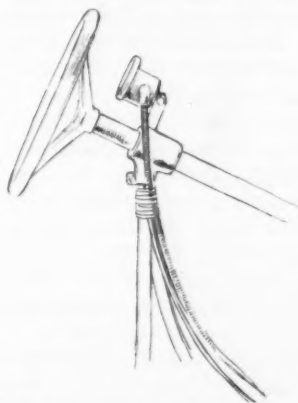
So far as the motors themselves are concerned, the American public will have an opportunity to see a greater variety of engine designs than ever has been offered. Not only will there be a competition between the poppet valve and the sleeve-valve designs, but among the poppet valve designs there will be a great variety. In addition to the familiar L

T-head and the still older valve-in-the-head constructions there are two valve arrangements new to the speedway, Duesenberg's motor with horizontal valves in the side of the cylinder, which made its debut at Algonquin hill climb last year and the diagonal arrangement of the valves in the cylinder head of the two Peugeots and the three Isottas which make their initial American appearance here.

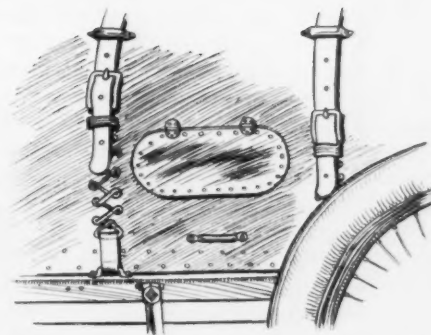
Knight motors appear in Pilette's Mercedes-Knight and in the Pennebaker Special. The Belgian's mount is the smallest car in the race, having a displacement of only 250 cubic inches. The four cylinders are cast in pairs and the sleeve valves have two inlet and two exhaust ports, each $2\frac{1}{2}$ by $\frac{1}{2}$ inches in size. The car weighs 2,380 pounds with gasoline, water and oil tanks filled. Pilette relies on continuous running rather than high speed to make a showing in the race.

Hopes for Non-Stop Run

He believes that he will be able to run the entire distance without a stop except for tires. This is on account of the exceptionally low consumption of fuel. He finds that at the speed he will endeavor to average he gets 21 miles per



HOW BURMAN BRACES STEERING COLUMN OF KEETON AND SPEEDOMETER



DE PALMA HAS DOOR FOR ENGINE ADJUSTMENTS IN MERCER

gallon of gasoline and the 40 gallons he carries will take him 720 miles. He believes his 10 gallons of oil will carry him the full distance. He does not attempt to account for this economy. His combination of light weight and wire wheels, together with the fact that the weight is evenly distributed over the wheels, he believes will reduce tire wear to a minimum.

Pennebaker's engine is a Knight and is much larger in size than the other, having within 7 cubic inches of the limit in displacement. It weighs about 2,500 pounds empty and carries the same quantity of supplies as does the other. The motor weighs 812 pounds.

Details of Isottas

The three Isottas to be piloted by Tetzlaff, Grant and the Italian Trucco, are alike so far as motor construction is concerned. They are unique in that there are two exhaust and two inlet valves in each cylinder operated by a camshaft which is above the cylinder heads. Pistons are of pressed steel and are very light.

All are new models, built expressly to meet the piston displacement requirements of 450 cubic inches, their cylinder measurements being 4 by 4.6 inches bore and

INDIANAPOLIS—INCLUDING DRIVERS, MECHANICS, MOTOR FEATURES AND PROBABLE EQUIPMENT

Carbureter		Location Control		Weight Car	Cap.		Wheel-base	Final Drive	Gear Ratio	Tires—Make		Size		Wire Wheels	Shock Absorbers
Make	Size	Steer	Shifter		Gas	Oil				Front	Rear				
Schebler	1½	Left	Center	2300	20	6	108	Shaft	2.25—1	Goodyear	34x4	34x4	Frayar	Hartford	
Schebler		Right	Right	2350	25	14	...	Shaft	2.25—1	Undecided	34x4½	34x4½	No	Hartford	
Schebler		Right	Right	2350	25	14	...	Shaft	2.25—1	Undecided	34x4½	34x4½	No	Hartford	
Rayfield	2½	Left	Center	2349*	29	14	108.3	Shaft	2—1	Undecided	33x4½	34x4½	McCue	Hartford	
Schebler	2½	Left	Center	2000	30	12	106.5	Shaft	2.25—1	Michelin	32x4	34x4½	....	Hartford
Schebler		Left	Center	2000	30	12	106.5	Shaft	2.25—1	Undecided	32x4	34x4½	....	Hartford
Zenith	2	Left	Center	2600	35	10	109	Shaft	2.50—1	Undecided	34x4½	34x4½	Rudge Whit	Hartford	
Schebler		Right	Right	2350	25	14	...	Shaft	2.25—1	Undecided	34x4½	34x4½	No	Hartford	
Claudel		Right	Right	2300	33	4	127	Shaft	2.25—1	Dunlop	34x4½	32x4½	....	Hartford
Harroun		Left	Center	2400	28	15	110	Shaft	2.43—1	Diamond	35x4½	35x4½	McCue	Hartford	
Miller	2	Right	Right	2640*	26	12	104.5	Shaft	2 or 2.17—1	Michelin	33x4½	36x5	No	Hartford	
Claudel	1.7	Right	Right	2200*	36	8	108	Shaft	2—1	Undecided	35x4	34x4½	Rudge Whit	....
Claudel	1.7	Right	Right	2200*	36	8	108	Shaft	2—1	Undecided	35x4	34x4½	Rudge Whit	....
Undecided	1½	Right	Right	2275	30	15	112	Shaft	2.25—1	Diamond	32x4	32x4	No	Hartford	
Miller		Left	Right	2200	31	8	110	Shaft	1.88—1	Michelin	32x4	32x4	No	Hartford	
Undecided	2½	Right	Right	....	35	18	108	Shaft	2.5—1	Undecided	32x4	32x4	No	Hartford
Undecided	2	Right	Right	....	35	18	112	Shaft	2.5—1	Undecided	34x4½	35x5	Rudge Whit	Hartford
Rayfield	2½	Right	Right	2450*	35	18	112	Shaft	Undecided	Undecided	33x4½	34x5	Rudge Whit	Hartford	
Mercedes		Right	Right	2380	40	10	...	Shaft	....	Michelin	32x4	34x4½	Rudge Whit	Maybach
Stearns	2	Right	Right	2500	40	10	106	Chain	1.75 or 2—1	Michelin	34x4	35x5	No	Hartford	
Undecided		Right	Right	2150	28	14	100	Shaft	2.3—1	Diamond	34x4½	34x4½	McCue	Hartford	
Undecided	2½	Right	Right	2680	30	10	105	Chain	....	Palmer Cord	34x4½	34x4½	Riley	Hartford
Master	2½	Right	Right	2680	30	10	105	Chain	....	Miller	34x4½	34x4½	Riley	Hartford
Undecided	2½	Right	Right	2660	30	10	105	Chain	....	Palmer Cord	34x4½	34x4½	Riley	Hartford
Rayfield	2½	Right	Right	2850	42	10	108	Chain	1.25—1	Braender	34x4½	37x5	....	Mercedes
Rayfield		Left	Center	2140*	28	12	108	Chain	2.13—1	Undecided	32x4	34x4½	McCue	Hartford	
Rayfield	2½	....	....	2260	28	12	104	Chain	2.13—1	Miller	32x4	34x4½	McCue	Hartford
Undecided		Left	Center	2280*	32	16	106	Shaft	2.19—1	Michelin	32x4	35x5	....	Hartford
Undecided		Left	Center	2000	30	12	106.5	Shaft	2.25—1	Undecided	32x4	34x4½	....	Hartford

*Tanks empty.

stroke. The piston displacement approximates 446 cubic inches. The four-cylinder motor has a block cylinder casting with two intake and two exhaust valves for each cylinder. The combustion is nearly hemispherical and the valves are in the heads and inclined slightly outwards, intakes at the right and exhausts opposite. Lying along the cylinder heads fore and aft is the camshaft and immediately above it the hollow shaft carrying the sixteen rocker arms for actuating the valves. Both camshafts, rocker arm shaft and valves are enclosed by an aluminum cover plate and pressure oil feed is used direct through the hollow rocker arm shaft and thence to each rocker arm. The camshaft runs in an oil level supplied through the rocker arm shaft.

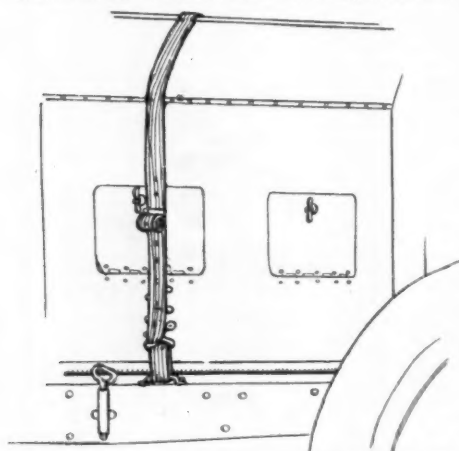
Steel Pistons Popular

Forged steel pistons are used, each fitted with two piston rings, but each ring being a two-coil spiral type. Connecting rods are tubular.

The car is fitted with two sets of brakes, all internal, one set on the front wheels, connected up with the emergency brake lever, and the other, on the rear wheels, connect with the pedal. The expanders are faced with cast iron.

Knipper's Henderson and the three Mason cars have the Deussenberg design of motor which did so well at Elgin and Milwaukee last year. In this the valves extend horizontally into the side of the cylinder, the push rods and rocker arms working in and out instead of up and down.

The valves and rocker arms in the Deussenberg motors are all on the left side of the motor and are covered by an aluminum housing, which makes the valve side of the block casting a smooth surface. The valves are operated by vertical rocker arms or walking beams whose lower ends bear on the side of the cams. The valves open directly into the explosion chamber so that there are no valve pockets. The intake manifold is integral with the cylinder casting and the exhaust passes directly upward through the top of the cylinder to a sheet-metal header, which is open at both ends. The forward end of the header sticks above the hood and the draft of air



MULFORD HAS HANDHOLES IN MERCEDES HOOD TO MAKE ADJUSTMENTS EASY

through it is expected to assist in scavenging the cylinders. The lower end of the inlet passages are cast as a part of the crankcase and the upper end as a part of the block casting. The cast iron pistons have three rings in one groove. One of the rings is twice as wide as the other and is placed below the other two. The clearance between piston and cylinder is .008 inch.

Lubrication of the valve operating mechanism consists in pumping oil through the hollow rocker arm shaft to the cams and bearings. The cooling system presents an oddity in that both pump and thermosiphon circulation is used, two water pipes being taken from the lower part of the radiator, one going direct to the motor by thermal action and the other passing through a light pump. The two systems join in a Y connection at the motor. The Mason cars have a turtle back and sharp nose and the Henderson has a somewhat tapered hood and flat tapered tail.

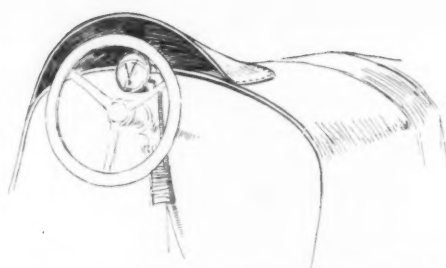
In the two Peugeots, driven by Goux and Zuccarelli, the valve operation is somewhat similar to that of the Isottas. The valves are in the head, and are set into the cylinder at an angle of about 30 degrees. The valves are in duplicate throughout and the seats are on the under side of the cylinder casting so that the valves are closed when they are raised. They are operated by a single camshaft running over the top of the cylinders, covered by an aluminum housing, and driven by a vertical shaft from the crankshaft. The pistons are cut from solid blocks of steel. The motors are block castings with cylinders of 4¼-inch bore and 7⅞-inch stroke. Oil is forced to the engine bearings at a pressure of 30 pounds per square inch. The pressure employed in most of the American racers is in the neighborhood of 2 pounds.

Many Features on Sunbeam

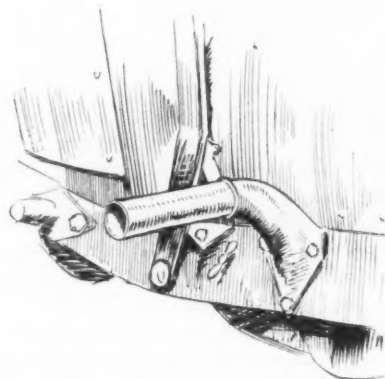
The car having the most features of interest to American eyes is the English Sunbeam. The motor is one of the three sixes in the race and is of the L-head type cast in blocks of three. Though all the valves are on the left side of the cylinder, the carburetor is on the right, the inlet manifold passing between the two cylinder castings. One of the novel features is the method of cooling the oil through a series of 1½-inch copper tubes arranged outside of the body and running from the motor to the tail.

The oiling system is a circulating one under a pressure of 25 pounds per square inch, and after the oil has been used in the motor it is sent through these cooling tubes before it is returned, thus assisting in cooling the motor.

Another evidence of thoughtfulness is the way the waste of water from a steaming radiator is prevented. Instead of allowing the steam to shoot out the overflow pipe, the latter is attached to a coil of small copper tubing in the form of a spiral which acts as condenser, returning the



SHIELD IN FRONT OF KEETON STEERING WHEEL



FALSE HUB ON SIDE OF ZUCCARELLI'S PEUGEOT FOR SPARE WHEEL

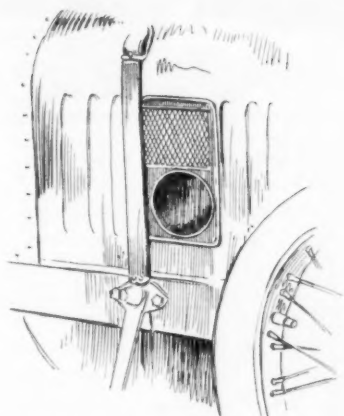
evaporation in the form of water to the radiator. Pistons are bored from a solid steel block and are very light. Demountable wood wheels are used. The brakes have fins for cooling them.

Mercedes Mulford's Mount

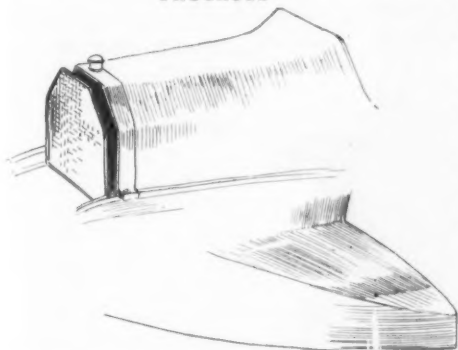
A combination of old favorites appears in No. 29, Ralph Mulford, driving de Palma's old Mercedes, with which the Italian came so close to winning last year's classic. With the exception of smaller cylinders made necessary by the lower limit of piston displacement the car is much the same as last year, except that Mulford has incorporated some minor details to suit his own methods of control. The motor is a valve-in-the-head construction, having an intake and two exhaust valves in each cylinder. The gear on the crankshaft for the timing drive is between the second and third cylinders. The car weighs 2,850 pounds complete, but is balanced so that it is only 25 pounds heavier in the rear than in the front. It is double-chain drive and cables are used as brake controls instead of the more common rods.

The three Mercers to be driven by de Palma, Bragg and Wishart have much the same features that characterized them last year. The motor is of the T-head type, cast in pairs. The transverse shaft in front of the motor and carrying pump and magneto is a feature still, but the chain timing gear drive is supplanted by a spur gear with skewed teeth. The pistons are cast steel. Bragg is using wood wheels, but the other two are equipped with Rudge-Whitworth wire wheels.

Disbrow and Nikrent's two four-cylinder Cases are similar in size and makeup. This involves a T-head motor cast in pairs, double-chain drive. Nikrent's car weighs the most, 2,260 pounds, while Disbrow's



HANDHOLE AND VENTILATOR ON THE PEUGEOTS



NOSE AND TAIL OF KNIPPER'S HENDERSON

mount tips the scales at 2,140. This difference is due to the difference in wheelbase, one being 4 inches longer than the other. The six-cylinder Case which Endicott is to pilot is an L-head motor with valves in the head. Two sets of exhaust valves are used. This car has shaft drive and weighs 2,280 pounds empty. Both Nikrent and Endicott have their balance well worked out so far as weight distribution between front and rear wheels is concerned. The four weighs only 150 pounds more in the rear than in the front, while there is only 40 pounds difference between front and rear on the six. Steel-forged pistons are used in Disbrow's car as well as those of his mates.

The Six-Cylinder Nyberg

Harry Endicott's Nyberg is the other one of the three six-cylinder cars entered in the race. The car has an L-head motor cast in pairs. The valves are comparative-

ly small, being $1\frac{3}{8}$ inches in diameter and $\frac{3}{8}$ -inch lift. The car weighs 2,300 pounds. Harry Endicott has gone in for reducing wind resistance, giving the body a streamline effect by a sharp nose and tail and a flaring shield in front of the steering wheel.

Burman's Keeton is one of the spectacular cars in looks as well as speed. The oddity in looks is due to the radiator location back of the motor. The motor is covered with the sloping European type of hood, which is simply a screen. The engine has T-head cylinders cast in pairs. The car weighs 2,349 pounds empty, only 100 pounds more in the rear than in the front. Burman has a special brace for the steering column.

Bracing Steering Column

A vertical rod is bolted to the side frame member and attached to the column by a T. Another brace of strap steel runs from that point to the transmission. It is curved and carries the shaft of the speedometer, which is mounted on the steering post. Brake controls are by cable and the emergency is operated by pedal.

The three Stutzes driven by Merz, Anderson and Herr are alike in every respect so far as can be told from the outside appearance. The motors at least are the same size, 4.814 by 5.5 inches. The Stutz company does not care to have all the details published at this time. It may be stated, however, that the motors are T-head, cast in pairs, and the cars weigh 2,350 pounds. They can carry 25 gallons of gasoline and 14 gallons of oil. The gear ratio is 2.25-1. There has been little attention paid to getting stream line body.

Wilcox's mount, the Fox Special, was built by Frank Fox, of this city, and has some novel features. The motor is a valve-in-the-head design with 2.25-inch valves made of chrome vanadium steel lifting $\frac{3}{8}$ inch. The car as a whole weighs 2,640 pounds empty. In that condition there is 16 pounds more weight over the front wheels than over the rear ones, but with load the rear wheels carry 240 pounds more than the front.

Special pains have been taken in the balance, but Fox relies more on his own special spring suspension to prevent tire wear. The springs have a deadened rebound that

absorbs the shocks, he finds. There is a double air control, one replacing the hand throttle control and the other beside the driver's seat. Fox has 92 pounds per square inch compression and finds that the motor will turn over at 2,800 revolutions.

Liesaw's Anel gets its cognomen from the name Lena, spelled backwards. It has a familiar type of valve-in-the-head motor with the spark plugs stuck in the side. This car is unique in two respects. So far as known at this time it is the only one that will attempt the race without differential action and the only one not having an aluminum crankcase. Liesaw finds the bronze crankcase holds up better and is using that material.

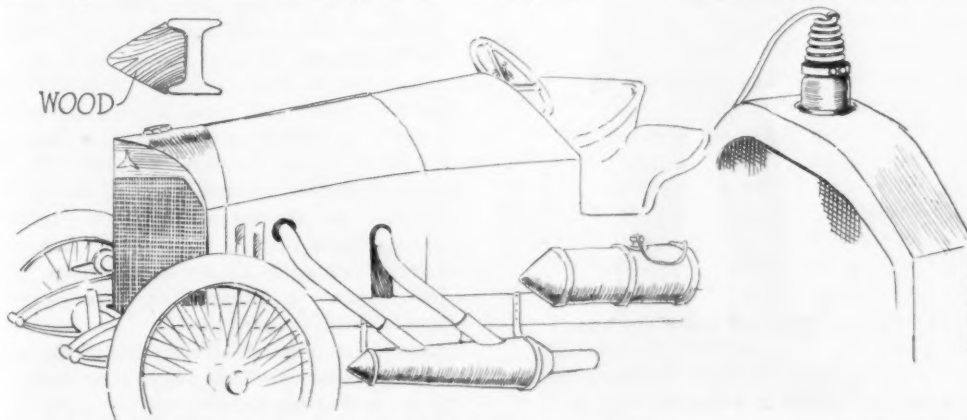
The Deltal was a veritable dark horse, a mysterious unknown, until it appeared at the track on Tuesday and caused the wise ones to open their eyes. The car is a very racy looking creation with streamline body and is to be driven by Joe Dawson, winner of last year's race. It is a four-cylinder car 4 by $5\frac{1}{8}$ inches bore and stroke. Cylinders are cast in block and the valves are on the right side and are $2\frac{1}{8}$ inches in diameter. Pistons are forged steel and weigh but $1\frac{3}{4}$ pounds and have but one ring. At 2,500 revolutions per minute the motor shows 118 horsepower. Oil is forced to motor bearings under 50 pounds pressure.

Clark's Tulsa is an Oklahoma entry and takes the name of its home city. It is a T-head motor with the cylinders cast in pairs. The car weighs 2,150 pounds empty.

Details of Schacht

Jenkins' Schacht is one of the light cars, weighing only 2,200 pounds approximately. It has one of the few conventional L-head motors; the valves are $2\frac{1}{2}$ inches in size and lift $\frac{3}{8}$ of an inch. A gear ratio of $1\frac{3}{4}$ to 1 is employed on high speed, with 32 by 4-inch tires. The wheels are wood and the rear ones are covered with sheet-metal shields. This is the only car using the shields this year, though last year many of the drivers tried out the shields in practice, abandoning them because they found steering difficult.

In the table on these pages is given the major details of construction of the cars and the probable equipment on them. The equipment listed is only probable, because changes are being made all the time.



PILLETTE RELIES ON CUTTING THE WIND—EVEN THE FRONT AXLE HAS A POINTED SHIELD



CONDENSER ON SUNBEAM RADIATOR CAP AND WIND SCREEN ON ENGLISH CAR

The Foreigners

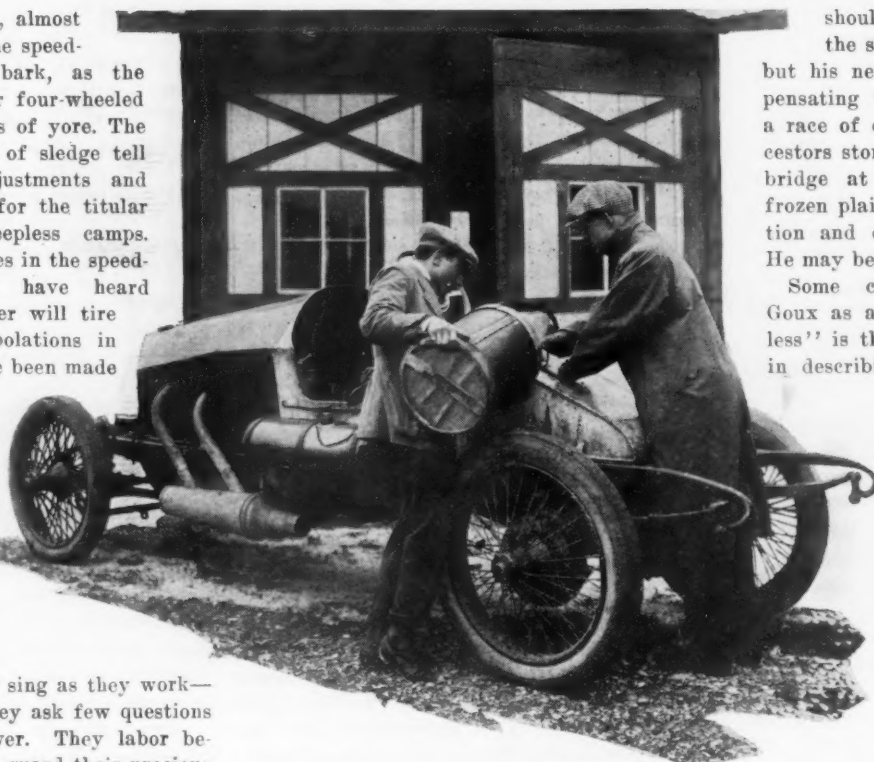
THERE are strange, almost false sounds, at the speedway. The motors' bark, as the drivers warm up their four-wheeled dreadnoughts, thrill as of yore. The rasp of file and ring of sledge tell of eleventh-hour adjustments and changes being made for the titular struggle in the sleepless camps. These are popular notes in the speedway symphony—you have heard them before and never will tire of them. But interpolations in the stirring score have been made this year by alien artistes who speak a foreign jargon and gesticulate wildly in conversation. The laugh of these invaders is shrill but musical, unlike the gruff haw-haw of the American.

Their songs—for they sing as they work—are unsynopated. They ask few questions and answer even fewer. They labor behind locked doors and guard their precious cars as if they feared an unknown enemy was plotting to pour dynamite in the cylinders.

Seekers after premature thrills seem most interested in the secretive challengers from France—Jules Goux and Paul Zuccarelli, the Peugeot drivers; Emil Begin and Ernest Flanelle, their mechanics; and Charles Faroux, editor of *La Vie Automobile* and *L'Automobile Technique*, consulting engineer of the Peugeot factory and director of the French racing destinies in the American invasion.

Although a veritable pigmy, Jules Goux is supreme in the Peugeot camp. He is the master, feared and respected—as powerful as a king in the gray garage where the fleet blue cars are housed. Europe hails him as the greatest of all speedway drivers. He is deserving of such homage because of his spectacular feat at Brooklands in April when he crowded 106 miles 307 yards within an hour. George Boillot, his absent teammate and winner of the grand prix, is said to be his superior in a road race but Goux is without parallel on a banked track, they say.

Scarcely 5 feet 6 inches in height and as straight and slender as a cotter pin, Goux seems anything but a great racing driver. He appears to be a typical Parisian boulevardier, more fitted to promenade the Champs Elysée than to sit at the wheel of a roaring monster of steel. Even when driving he is faultlessly dressed. His puttees are of soft tan doeskin, his black and white checked knickerbockers are unspotted by grease.



PILETTE WITH THE GERMAN MERCEDES-KNIGHT

Compared with his Yankee foemen in dirty, but businesslike khaki, he is a Beau Brummel, a motoring dandy.

But Jules Goux is not a challenger to be underestimated or despised because of sartorial foibles. He may lack the broad

shoulders of a de Palma and the strength of a Bruce-Brown but his nerve and daring are compensating virtues. He comes from a race of courageous men. His ancestors stormed the Bastille, held the bridge at Lodi and died on the frozen plains of Russia. Determination and courage are his heritage. He may be beaten but he won't quit.

Some critics might condemn Goux as a reckless driver. "Restless" is the better adjective to use in describing his gyrations on the speedway. Because he is a bundle of nerves, because he is daring, because he knows the speed of his car, the little Frenchman opens up with a fate-disdaining confidence that is spine-jolting and goes into the turns with a nonchalance that seems foolhardy.

It is doubtful whether another driver at the speedway is as intimate with his car as is

Goux. Born in the suburbs of Paris within a stone's throw of the Peugeot factory 25 years ago, the European track champion was destined from birth to become a cog in the motor industry. His father was factory superintendent at the Peugeot plant for 30 years. Jules learned the theory of mechanics in technical schools of France. His practical knowledge was gained at the work bench where he served an apprenticeship under his father. He is driver, designer and engineer, a sort of motor trinity.

Paul Zuccarelli, Goux's teammate, is an Italian. Although a native of Milan, the home of the Milan hat, he is anything but a man of straw. He is the antithesis of Goux—large and powerful; inclined to be frivolous; laughs, sings and jokes all through the busy, nerve-racking day; and wears two-franc overalls, with broad bib to protect his obese tummy from splattering grease, when he thunders over the bricks of the red oval in his blue car. Goux's mustache is sparse and neatly trimmed, the mustache of a dandy. Zuccarelli's hirsute adornment is almost terrifying and sprouts untamed and uncultured on his upper lip, the mustache of a warrior. Goux knits his brow in serious determination. Zuccarelli's blue eyes twinkle with merriment. They are a strange combination—Goux, the scheming, daring Napoleon; Zuccarelli, the powerful, good-natured Garibaldi.

Possessed of wonderful stamina and superhuman strength, Zuccarelli drives



CHARLES FAROUX

with brute force and take chances that would be fatal to a man of weaker physique. When his headstrong car skids on the tortuous turns and machine challenges man for the mastery, the Italian fights the obstinate Peugeot and tames it with muscles of steel. He is the typical foreign driver. He looks and acts the part. Perhaps not as sagacious and heady as the American, he is more daring and triumphs because of his tremendous desperation.

In the broad fields beyond the back stretch of the speedway stands a cottage. It is the camp of the Peugeot team. Zucarelli calls it "mia casa," his home in a strange land. At night, when the speedway roars no more and the garage doors are bolted, the sentimental Italian sits on the vine-screened porch, smoking his cigaret and dreaming of a romantic land of perpetual summer across the Atlantic. He is alone. Goux, nervous, unsettled Goux, is studying la vie American in the cafes and clubs of Indianapolis. Zucarelli, although deserted, is happy. He sings to the stars, humming in sweet tenor voice his favorite selections from the immortal operas of Verdi, Ponchielli and Mascagni. A strange divertimento for a racing driver indeed!

Zucarelli also is a designer, a builder of racing cars. A protege of Suiza, the maker of the triumphant Hispano-Suiza, the Italian is regarded as pioneer in the European engineering field. He has won many trophies, too many, he says, to remember them all at this time.

Like Goux, the mechanics of the Peugeot team are small and compared with the American oil-pumper, lowly menials. They serve as valets, carrying the luggage and assisting the drivers in making their toilet. They salute

Goux and Zucarelli like soldiers saluting a colonel. They are ever under orders and never take the initiative. Goux and Zucarelli do the directing; Begin and Flanelle, the work. When the doors are locked for the night, they stroll off across the field together, talking little but seeing much. They are not companions of the Peugeot pilots. Theirs is a lower station and they do not attempt to jest and play with their superiors. Both have served in the army. They know what it is to obey.

M. Charles Faroux is a gentleman sportsman, a power in French motor racing circles. He is keenly interested in American cars and stands for hours in the infield clocking

the practice laps of the much-feared Yankee contenders. Before he sailed from Havre 6 weeks ago, M. Faroux considered all sport in the United States primitive. He now apologizes in broken English. American is beaucoup pays, crede M. Faroux, and next season he will chaperone at least eight French drivers on an American invasion.

In company with M. Goux and Signor Zucarelli, M. Faroux will witness the coup de boxe between Monsieur Klaus and Monsieur Dillon Thursday night. This engagement has caused Director Sedwick of the speedway considerable worry. He fears that after the bout, Goux will wish to make the rounds of the cafes as in that dear France, Zucarelli will insist on singing to the stars all night and such dissipation may weaken them for the 7-hour ordeal of Memorial day.

The French drivers are very suspicious. They associate very little with the American pilots, work upon their cars behind locked doors and have an armed watchman stationed at their garage. They have either been told that the Americans are vandals or think that the speed bugs of America are as insanely patriotic as those of France where the passionate peasants often attempt to damage an invader's machine that La Belle France may win. Instead of visiting the American camps and inspecting the motors at close range, they stand at the windows of their shed and play the lenses of their field glasses on the torn-down cars of opponents.

Albert Guyot, the driver of the English Sunbeam, is a Parisian and like Goux is short but far from slender. He also is a licensed aviator and a motor boat pilot. He will drive the Delage car in the grand prix in July. Guyot's

mechanician and relief is R. F. L. Crossman of the English navy, who, after being wounded in the Boxer rebellion, took up motor racing when invalided out of the service. Crossman holds a number of world's records made at Brooklands and is the foremost speedway pilot of Great Britain.

Theodore Pilette is Belgium's native son in the 500-mile race, the Mercedes-Knight driver being born in Brussels, where he is the Belgian agent of the Daimler Motoren Gesellschaft. He, too, must be classed as a midget with Goux, Guyot and Louis Disbrow. Pilette is a gentleman driver, an amateur who drives for the love of the game. His

forte is road racing and he makes his debut on a speedway at Indianapolis. He will race at Elgin this fall.

Italy will furnish the "come back," Vincenzo Trucco, teammate of Harry Grant and Teddy Tetzlaff. Trucco has not driven since 1908 when he won the Targa Florio cup. After a 5-year retirement, he will celebrate his recrudescence at the wheel of the Isotta. He did not arrive at the speedway until the eleventh hour, hence the fans have had little chance to study his characteristics.

The railbird is in a quandary not knowing French. He may be wise to the formulae for figuring out gear ratio and piston displacement? Suppose he is. That is no accomplishment. If he could speak French, then he'd have something to brag about. Also shed a tear for perturbed Charley Rayfield, perplexed Bill Thompson and other sorrowing accessory men who might as well be tongue-tied as the way they are. What chance have they of talking carbureter, graphite, magneto, spark plug and tire virtues to the invaders? C'est dommage.



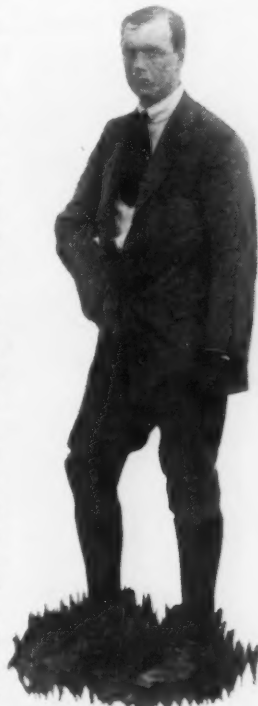
ZUCARELLI



GOUX



GUYOT



CROSSMAN

Drivers in



THE Indianapolis race brings together many of the veterans, and there are nine who have been in both of the previous 500-mile races at Indianapolis. This list includes Herr, Anderson and Merz of the Stutz team, Burman of the Keeton, de Palma of the Mercer, Mulford of the Mercedes, Tetzlaff of the Isotta, Disbrow and Bill Endicott of the Case and Harry Endicott of the Nyberg.

Of America's defenders possibly de Palma is most in the limelight because of his hard luck last year when mechanical trouble stopped him with two laps more to go, and with a lead of 15 miles over Dawson, his nearest competitor. De Palma's record is well known. Equally at home on road, track or speedway, he long has been before the public. His most recent feats were the winning of the Elgin National trophy and the free-for-all at Elgin last year which was followed by victory in the Vanderbilt and his accident in the grand prix.

Ralph Mulford is in this year in a foreign car, a Mercedes. Mulford, too, has long been before the public and like de Palma he has to his credit a victory in the Vanderbilt and he also was the first of the Elgin National trophy. In the 500-mile race of 1911 he was second to Harroun and a very close second at that.

Bragg, who is de Palma's teammate, is another of the first flight, his greatest achievement being the winning of the American grand prix of Milwaukee last year. Wishart the third Mercerite, is a veteran of several Vanderbilts and long looked upon as one of America's foremost drivers.

In Merz, Herr and Endicott, the Stutz people have three men who rank with the best in the country. Two years ago Merz made the second best showing of any road race driver in the country, while that same summer Herr won the Illinois trophy at the Elgin meet. Anderson won distinction at Milwaukee last fall by being the first to finish of an American car.

The Case team has three hardy campaigners in Disbrow, Bill Endicott and Joe Nikrent. Disbrow is the best known of the trio and last year he was credited with having won more races on the dirt track than any other man. Endicott was in last year's speedway race. He ran into fifth place with the Schacht. Nikrent, the Californian, made motor history before he left the coast to campaign in the middle west. Two of our champions are in foreign cars—Harry Grant and Teddy Tetzlaff, who are to drive Isottas. Grant is the only man who ever won two Vanderbilt cup races, and Tetzlaff is the holder of the world's road record of 78.7 miles

1913 Sweepstakes

per hour, while he came so close to winning both the grand prix and Vanderbilt at Milwaukee last fall that fans are still wondering why he didn't.

Bob Burman is another celebrity—the man who has traveled faster in 1 mile than any other human being, a distinction he won at Daytona, 2 years ago when he covered a mile over the sand beach at the rate of 142 miles an hour. Like both de Palma and Disbrow, Burman is especially strong at dirt track racing.

Evans, Tower and Haupt of the Mason team are well known. Evans and Tower raced last year for the E-M-F and 2 years ago in the 500-mile race Tower drove a Jackson and Evans was his mechanic. Haupt has been out of contest for the last two seasons, but in 1909 and 1910 he was a particularly bright star.

Harry Endicott won both the Jencks and Wisconsin cups at Elgin and Milwaukee last year, and assisted materially in landing the Schacht in fifth place in the Indianapolis speedway races.

Johnny Jenkins was a former prizefighter, but in 1911 he took up motor racing and did well as a member of the Cole team. Last year he took the White six-cylinder and finished seventh in it in the 500-mile race.

George Clark drove a Mercedes in both the Elgin and Milwaukee road races. He has been a follower of dirt track circuit, but this is to be his first appearance in a speedway event. As for the other American drivers, they have yet to win their spurs.

Every one of the five foreigners is a man of reputation. Goux made the best showing of any of the foreigners last year, and this season he startled the critics by smashing the world's hour record by driving more than 106 miles in 1 hour on the Brooklands track in England. His teammate, Zuccarelli, is almost as well known in Europe where he has long been a most consistent performer. He started his racing career in a Hispano-Suiza.

Guyot is a Frenchman, who is to drive an English car, a Sunbeam. He is well thought of on the other side of the Atlantic. Trucco, the Italian has been out of the racing game since 1908 when he distinguished himself by winning the Targa Florio in Sicily.

Pilette drove his first big road race in 1906, the Ardennes circuit event, in which he handled the 90 Mercedes. In 1908 he established several world's straightaway records at Spa; in 1910 he participated in the Prince Henry tour; in 1911 he established a new record from Brussels, Belgium, to Marseilles, France, and in 1912 he ran second in the Belgium grand prix race.



BRAGG



WISHART



DE PALMA



W. ENDICOTT



BURMAN



NIKRENTZ



HERR

DISBROW



ANDERSON



MERZ



CLARK



EVANS



TOWER



HAUPT

Drivers in



THE Indianapolis race brings together many of the veterans, and there are nine who have been in both of the previous 500-mile races at Indianapolis. This list includes Herr, Anderson and Merz of the Stutz team, Burman of the Keeton, de Palma of the Mercer, Mulford of the Mercedes, Tetzlaff of the Isotta, Disbrow and Bill Endicott of the Case and Harry Endicott of the Nyberg.

Of America's defenders possibly de Palma is most in the limelight because of his hard luck last year when mechanical trouble stopped him with two laps more to go, and with a lead of 15 miles over Dawson, his nearest competitor. De Palma's record is well known. Equally at home on road, track or speedway, he long has been before the public. His most recent feats were the winning of the Elgin National trophy and the free-for-all at Elgin last year which was followed by victory in the Vanderbilt and his accident in the grand prix.

Ralph Mulford is in this year in a foreign car, a Mercedes. Mulford, too, has long been before the public and like de Palma he has to his credit a victory in the Vanderbilt and he also was the first of the Elgin National trophy. In the 500-mile race of 1911 he was second to Harroun and a very close second at that.

Bragg, who is de Palma's teammate, is another of the first flight, his greatest achievement being the winning of the American grand prix of Milwaukee last year. Wishart the third Mercerite, is a veteran of several Vanderbilts and long looked upon as one of America's foremost drivers.

In Merz, Herr and Endicott, the Stutz people have three men who rank with the best in the country. Two years ago Merz made the second best showing of any road race driver in the country, while that same summer Herr won the Illinois trophy at the Elgin meet. Anderson won distinction at Milwaukee last fall by being the first to finish of an American car.

The Case team has three hardy campaigners in Disbrow, Bill Endicott and Joe Nikrent. Disbrow is the best known of the trio and last year he was credited with having won more races on the dirt track than any other man. Endicott was in last year's speedway race. He ran into fifth place with the Schacht. Nikrent, the Californian, made motor history before he left the coast to campaign in the middle west. Two of our champions are in foreign cars—Harry Grant and Teddy Tetzlaff, who are to drive Isottas. Grant is the only man who ever won two Vanderbilt cup races, and Tetzlaff is the holder of the world's road record of 78.7 miles

1913 Sweepstakes

per hour, while he came so close to winning both the grand prix and Vanderbilt at Milwaukee last fall that fans are still wondering why he didn't.

Bob Burman is another celebrity—the man who has traveled faster in 1 mile than any other human being, a distinction he won at Daytona, 2 years ago when he covered a mile over the sand beach at the rate of 142 miles an hour. Like both de Palma and Disbrow, Burman is especially strong at dirt track racing.

Evans, Tower and Haupt of the Mason team are well known. Evans and Tower raced last year for the E-M-F and 2 years ago in the 500-mile race Tower drove a Jackson and Evans was his mechanic. Haupt has been out of contest for the last two seasons, but in 1909 and 1910 he was a particularly bright star.

Harry Endicott won both the Jencks and Wisconsin cups at Elgin and Milwaukee last year, and assisted materially in landing the Schacht in fifth place in the Indianapolis speedway races.

Johnny Jenkins was a former prize-fighter, but in 1911 he took up motor racing and did well as a member of the Cole team. Last year he took the White six-cylinder and finished seventh in it in the 500-mile race.

George Clark drove a Mercedes in both the Elgin and Milwaukee road races. He has been a follower of dirt track circuit, but this is to be his first appearance in a speedway event. As for the other American drivers, they have yet to win their spurs.

Every one of the five foreigners is a man of reputation. Goux made the best showing of any of the foreigners last year, and this season he startled the critics by smashing the world's hour record by driving more than 106 miles in 1 hour on the Brooklands track in England. His teammate, Zuccarelli, is almost as well known in Europe where he has long been a most consistent performer. He started his racing career in a Hispano-Suiza.

Guyot is a Frenchman, who is to drive an English car, a Sunbeam. He is well thought of on the other side of the Atlantic. Trucco, the Italian has been out of the racing game since 1908 when he distinguished himself by winning the Targa Florio in Sicily.

Pilette drove his first big road race in 1906, the Ardennes circuit event, in which he handled the 90 Mercedes. In 1908 he established several world's straightaway records at Spa; in 1910 he participated in the Prince Henry tour; in 1911 he established a new record from Brussels, Belgium, to Marseilles, France, and in 1912 he ran second in the Belgium grand prix race.



BRAGG



WISHART



DE PALMA



W. ENDICOTT



BURMAN



NIKRENT



HERR

DISBROW



ANDERSON



CLARK



MERZ



TOWER



EVANS



HAUPT

History of Indianapolis Motor Speedway

AMERICAN SPEEDWAY RECORDS

Distance	Time	M.P.H.	Driver	Car	Place	Date
1/4 mile.....	:08.16	111	Burman	Blitzen-Benz	Indianapolis	May 29, 1911
1/2 mile.....	:16.80	110	Burman	Blitzen-Benz	Indianapolis	May 29, 1911
1 kilo.....	:21.40	104.46	Burman	Blitzen-Benz	Indianapolis	May 29, 1911
1 mile.....	:35.35	101.83	Burman	Blitzen-Benz	Indianapolis	May 29, 1911
2 miles.....	1:15.06	94.78	Bragg	Flat	Los Angeles	Apr. 13, 1910
3 miles.....	1:54.83	94.06	Bragg	Flat	Los Angeles	May 5, 1912
4 miles.....	2:33.37	93.89	Bragg	Flat	Los Angeles	May 5, 1912
5 miles.....	3:11.75	93.87	Bragg	Flat	Los Angeles	May 5, 1912
10 miles.....	6:35.62	90.99	Robertson	Simplex	Los Angeles	Apr. 9, 1910
15 miles.....	10:25.17	86.37	Hearne	Benz	Indianapolis	July 4, 1910
20 miles.....	14:06.72	84.08	Hearne	Benz	Indianapolis	July 4, 1910
25 miles.....	18:22.60	81.62	Tetzloff	Lozler	Los Angeles	Mar. 19, 1911
50 miles.....	36:35.80	81.97	Tetzloff	Lozler	Los Angeles	Mar. 19, 1911
75 miles.....	54:50.20	82.06	Tetzloff	Lozler	Los Angeles	Mar. 19, 1911
100 miles.....	1:13:37.25	81.04	Tetzloff	Flat	Indianapolis	May 30, 1912
150 miles.....	1:49:52.84	81.90	Tetzloff	Flat	Indianapolis	May 30, 1912
200 miles.....	2:25:59.52	82.19	Tetzloff	Flat	Indianapolis	May 30, 1912
250 miles.....	3:07:13.94	80.11	Tetzloff	Flat	Indianapolis	May 30, 1912
300 miles.....	3:48:49.30	78.67	Dawson	National	Indianapolis	May 30, 1912
350 miles.....	4:25:15.27	78.41	Dawson	National	Indianapolis	May 30, 1912
400 miles.....	5:04:14.23	78.88	Dawson	National	Indianapolis	May 30, 1912
450 miles.....	5:44:04.54	78.47	Dawson	National	Indianapolis	May 30, 1912
500 miles.....	6:21:06.03	78.72	Dawson	National	Indianapolis	May 30, 1912

FOREIGN SPEEDWAY RECORDS

Distance	Time	M.P.H.	Car	H.P.	Place	Date
1/2 mile (s. s.).....	25.566	70.406	Benz	84.8	Brooklands	Nov. 8, 1909
1/2 mile (f. s.).....	14.076	127.877	Benz	84.8	Brooklands	Nov. 8, 1909
1 mile (s. s.).....	41.268	87.233	Benz	84.8	Brooklands	Nov. 8, 1909
1 mile (f. s.).....	31.055	115.923	Benz	84.8	Brooklands	Nov. 8, 1909
1 kilo (s. s.).....	31.327	71.409	Benz	84.8	Brooklands	Nov. 8, 1909
1 kilo (f. s.).....	17.761	125.947	Benz	84.8	Brooklands	Nov. 8, 1909
50 miles (s. s.).....	28:18.65	105.97	Peugeot	30	Brooklands	Apr. 12, 1913
100 miles (s. s.).....	56:29.93	106.40	Peugeot	30	Brooklands	Apr. 12, 1913
106 miles 387 yds... 1:00:00.00		106.22	Peugeot	30	Brooklands	Apr. 12, 1913
150 miles... 1:28:25.67		101.59	Peugeot	30	Brooklands	Apr. 12, 1913
189 miles 1,747 yds... 2:00:00.00		94.99	Lorraine-Dietrich	59.6	Brooklands	Nov. 27, 1912
200 miles... 2:05:58.73		95.51	Lorraine-Dietrich	59.6	Brooklands	Nov. 27, 1912
284 miles 817 yds... 3:00:00.00		94.82	Lorraine-Dietrich	59.6	Brooklands	Nov. 27, 1912
300 miles... 3:30:17.54		85.60	Thames	59.8	Brooklands	Nov. 5, 1909
344 miles 1,344 yds... 4:00:00.00		86.19	Lorraine-Dietrich	59.6	Brooklands	Nov. 27, 1912
400 miles... 4:34:23.87		87.46	Lorraine-Dietrich	59.6	Brooklands	Nov. 27, 1912
422 miles 1,574 yds... 5:00:00.00		84.59	Lorraine-Dietrich	59.6	Brooklands	Nov. 27, 1912
500 miles... 5:48:38.87		86.05	Lorraine-Dietrich	59.6	Brooklands	Nov. 27, 1912
518 miles 312 yds... 6:00:00.00		86.36	Lorraine-Dietrich	59.6	Brooklands	Nov. 27, 1912
525 miles 568 yds... 7:00:00.00		75.05	Sunbeam	30.1	Brooklands	Sept. 1, 1911
600 miles... 7:57:59.55		75.32	Sunbeam	30.1	Brooklands	Sept. 1, 1911
602 miles 971 yds... 8:00:00.00		75.32	Sunbeam	30.1	Brooklands	Sept. 1, 1911
678 miles 158 yds... 9:00:00.00		75.34	Sunbeam	15.9	Brooklands	Sept. 1, 1911
700 miles... 9:16:34.02		75.46	Sunbeam	15.9	Brooklands	Sept. 1, 1911
757 miles 248 yds... 10:00:00.00		75.71	Sunbeam	30.1	Brooklands	Sept. 1, 1911
800 miles... 10:34:29.88		75.65	Sunbeam	30.1	Brooklands	Sept. 1, 1911
832 miles 1,704 yds... 11:00:00.00		75.72	Sunbeam	30.1	Brooklands	Sept. 1, 1911
900 miles... 11:52:03.20		75.83	Sunbeam	15.9	Brooklands	Sept. 21, 1912
910 miles 1,738 yds... 12:00:00.00		75.92	Sunbeam	15.9	Brooklands	Sept. 21, 1912
987 miles 1,548 yds... 13:00:00.00		75.99	Sunbeam	15.9	Brooklands	Sept. 21, 1912
1,000 miles... 13:08:25.10		76.102	Sunbeam	15.9	Brooklands	Sept. 21, 1912
938 miles 480 yds... 14:00:00.00		67.02	Napier	60	Brooklands	June 29, 1907
1,006 miles 1,640 yds... 15:00:00.00		67.13	Napier	60	Brooklands	June 29, 1907
1,068 miles 400 yds... 16:00:00.00		66.76	Napier	60	Brooklands	June 29, 1907
1,139 miles 1,100 yds... 17:00:00.00		67.03	Napier	60	Brooklands	June 29, 1907
1,203 miles 830 yds... 18:00:00.00		66.86	Napier	60	Brooklands	June 29, 1907
1,263 miles 1,170 yds... 19:00:00.00		66.51	Napier	60	Brooklands	June 29, 1907
1,327 miles 1,190 yds... 20:00:00.00		66.38	Napier	60	Brooklands	June 29, 1907
1,390 miles 1,100 yds... 21:00:00.00		66.20	Napier	60	Brooklands	June 29, 1907
1,458 miles 130 yds... 22:00:00.00		66.27	Napier	60	Brooklands	June 29, 1907
1,519 miles 360 yds... 23:00:00.00		66.05	Napier	60	Brooklands	June 29, 1907
1,581 miles 1,310 yds... 24:00:00.00		65.905	Napier	60	Brooklands	June 29, 1907

THIRTEEN times as large as the biggest hippodrome of the Roman emperors, the Indianapolis motor speedway is the modern Circus Maximus.

Compared with the stage on which the greatest and richest of all speed spectacles will be set Memorial day, the Circus Maximus of the restless turbulent Latins was a one-ring affair and far below the notice of a Barnum or a Ringling. According to Pliny, the ancient historian, the Circus Maximus was 1,875 feet long and 625 feet wide, giving it an area of 1,171,875 square feet. The speedway covers 328 acres or 14,287,680 square feet. One hundred thousand spectators, turning down their thumbs to the wounded gladiator's appeal, was considered a capacity house by Nero 2,000 years or more ago. According to late estimates, almost twice that number of speed fanatics will raise their voices to greet a victor May 30, 1913.

Excellently situated, only 4 1/2 miles northwest of the Hoosier metropolis and easily accessible by two motoring routes as well as the Ben Hur traction line and the Big Four and C. H. and D. railroads, the Indianapolis motor speedway is a temple dedicated to Mercury. Within the walls of the speed god's shrine are forty-one buildings, including garages, cottages for the members of racing teams, aerodromes and aviation sheds.

The grandstands—there are four—and the boxes have a seating capacity of 60,000, there are parking facilities for 10,000 motor cars and the entire grounds will accommodate 200,000 spectators.

Glaring in the May sun like a huge red saucer is the 2 1/2-mile track of vitrified brick on which the contenders for the \$50,000 in prize money will clash. Built first of macadam, a material which proved unsuitable after the first test in 1909, the oval was reconstructed 3 years ago, 3,500,000 bricks being required to pave the course. The turns are banked 16 feet and have a radius of 1,500 feet. A cement wall, 3 feet high and 11 inches thick, extends around the outer edge of the turns.

There is but one other track in the world that challenges the Indianapolis motor speedway for supremacy. That is the famous Brooklands, the English course of 2 3/4 miles, on which Percy Lambert in the Talbot first crowded 100 miles within an hour and Jules Goux, who will drive the No. 14 Peugeot in the 500-mile race, covered 106 miles and 387 yards in 60 minutes.

Comparative records show Brooklands to be the speedier track. Taking the 500-mile mark as an example, Hemery in the Lorraine-Dietrich last November was clocked for the 5 centuries in 5:48:38.87, an average of 86.05 miles an hour. The best time for this distance at Indianapolis, 6:21.06, was made by Dawson last year.

Speedway Race Pace as Told by Chart

SPEED FANS in general and particularly those attending the 500-mile sweep-stakes race at Indianapolis will be interested in the chart by which the speed of any car for different distances on the speedway track may be found.

The table below gives the time required to make 1, 40, 80, 120, 160, or 200 laps at speeds from 70 to 90 miles per hour.

Select the column headed by the number of laps and in it find the nearest time in hours, minutes and seconds; opposite this in the right-hand column will be found the speed corresponding to that time. For instance, to find the speed of a car that makes one lap in 2 minutes 5 seconds, take the first column, headed "1 Lap" and drop the fifth line reading 2:05:0; opposite this in the last column is 72 miles per hour.

More accurate figures of the speed for one lap will be found on the curve-chart. To find the average speed in miles per hour for $2\frac{1}{2}$ miles or one lap of the

track, use the chart as follows: On the vertical line corresponding to the time as marked at the bottom of the chart run up to

SPEEDS FOR DIFFERENT DISTANCES ON INDIANAPOLIS SPEEDWAY

1 Lap 2½ M.	40 Laps 100 Miles		80 Laps 200 Miles		120 Laps 300 Miles		160 Laps 400 Miles		200 Laps 500 Miles		Miles per hour						
Min. Sec.	Min. Sec.	Min. Sec.	Min. Sec.	Min. Sec.	Min. Sec.	Min. Sec.	Min. Sec.	Min. Sec.	Min. Sec.								
2	18.4	1	32	16	3	04	32	4	30	48	6	09	04	7	41	20	65
2	17.4	1	31	36	3	03	12	4	34	48	6	06	24	7	38	00	½ 66
2	16.4	1	30	46	3	01	32	4	32	18	6	03	04	7	33	50	½ 67
2	15.4	1	30	16	3	00	32	4	30	48	6	01	04	7	31	20	½ 68
2	14.4	1	29	36	2	59	12	4	28	48	5	58	24	7	28	00	½ 69
2	13.4	1	28	56	2	57	52	4	26	48	5	55	44	7	24	40	½ 70
2	12.4	1	28	16	2	56	32	4	24	48	5	53	04	7	21	20	½ 71
2	11.4	1	27	36	2	55	12	4	22	48	5	50	24	7	18	00	½ 72
2	10.4	1	26	56	2	53	52	4	20	48	5	47	44	7	14	40	½ 73
2	09.6	1	26	24	2	52	48	4	19	12	5	45	36	7	12	00	½ 74
2	08.6	1	25	44	2	51	28	4	18	12	5	42	56	7	08	40	½ 75
2	07.6	1	25	04	2	50	08	4	15	12	5	40	16	7	05	20	½ 76
2	06.8	1	24	32	2	49	04	4	13	36	5	38	08	7	02	40	½ 77
2	05.8	1	23	52	2	47	44	4	11	36	5	35	28	6	59	20	½ 78
2	05.0	1	23	20	2	46	40	4	09	00	5	33	20	6	56	40	½ 79
2	04.2	1	22	48	2	45	36	4	08	24	5	31	12	6	54	00	½ 80
2	03.4	1	22	16	2	44	32	4	06	48	5	29	04	6	51	20	½ 81
2	02.4	1	21	36	2	43	12	4	04	48	5	26	24	6	48	00	½ 82
2	01.6	1	21	04	2	42	08	4	03	12	5	24	16	6	45	20	½ 83
2	00.8	1	20	30	2	41	00	4	01	30	5	22	00	6	42	30	½ 84
2	00.0	1	20	00	2	40	00	4	00	00	5	20	00	6	40	00	½ 85
1	59.2	1	19	28	2	38	56	3	58	24	5	17	52	6	37	20	½ 86
1	58.4	1	18	56	2	37	52	3	56	48	5	15	44	6	34	40	½ 87
1	57.6	1	18	24	2	36	48	3	55	12	5	13	36	6	32	00	½ 88
1	56.8	1	17	52	2	35	44	3	53	36	5	11	28	6	29	20	½ 89
1	56.0	1	17	20	2	34	40	3	52	00	5	09	20	6	26	40	½ 90
1	55.4	1	16	56	2	33	52	3	50	48	5	07	44	6	24	00	½ 91
1	54.6	1	16	24	2	32	48	3	49	12	5	05	36	6	22	00	½ 92
1	53.8	1	15	52	2	31	44	3	47	36	5	03	28	6	19	20	½ 93
1	53.2	1	15	28	2	30	56	3	46	24	5	01	52	6	17	20	½ 94
1	52.4	1	14	56	2	29	52	3	44	48	4	59	44	6	14	40	½ 95
1	51.8	1	14	32	2	28	04	3	43	36	4	58	08	6	12	40	½ 96
1	51.2	1	14	08	2	28	16	3	42	24	4	56	32	6	10	40	½ 97
1	50.4	1	13	36	2	27	12	3	40	48	4	54	24	6	08	00	½ 98
1	49.6	1	13	04	2	26	08	3	39	12	4	52	16	6	05	20	½ 99
1	49.0	1	12	40	2	25	20	3	38	00	4	50	40	6	03	20	½ 100
1	48.4	1	12	16	2	24	32	3	36	48	4	49	04	6	01	20	½ 101
1	47.8	1	11	52	2	23	44	3	35	36	4	47	28	5	59	20	½ 102
1	47.2	1	11	28	2	22	56	3	34	24	4	45	52	5	57	20	½ 103
1	46.6	1	11	00	2	22	00	3	33	00	4	44	00	5	55	00	½ 104
1	45.8	1	10	32	2	21	04	3	31	36	4	42	08	5	52	40	½ 105
1	45.2	1	10	08	2	20	16	3	30	24	4	40	32	5	50	40	½ 106
1	44.6	1	09	44	2	19	28	3	29	12	4	38	56	5	48	40	½ 107
1	44.0	1	09	20	2	18	40	3	28	00	4	37	20	5	46	40	½ 108
1	43.4	1	08	56	2	17	52	3	26	48	4	35	44	5	44	40	½ 109
1	42.8	1	08	32	2	17	04	3	25	36	4	34	08	5	42	40	½ 110
1	42.2	1	08	08	2	16	16	3	24	24	4	32	32	5	40	40	½ 111
1	41.6	1	07	44	2	15	28	3	23	12	4	30	56	5	38	40	½ 112
1	41.2	1	07	28	2	14	56	3	22	21	4	29	52	5	37	20	½ 113
1	40.6	1	07	04	2	14	08	3	21	12	4	28	16	5	35	20	½ 114
1	40.0	1	06	40	2	13	20	3	20	00	4	26	40	5	33	20	½ 115

the curved line; where the curve intercepts the vertical line, follow the horizontal line to the left, the figures representing the miles per hour.

For instance, let us suppose, as an example, that a car in which you are interested makes one lap of the track in 2 minutes flat and it is desired to know how fast it was going. At the bottom of the chart on the bottom line marked "Time in Minutes and Seconds," etc., find the vertical line marked 2:00. Glance up this vertical line till it hits the curved edge of the diagram. From there follow the horizontal line to the left edge marked "Miles per Hour" and read the figure at the end of the line—in this case 75. This means the car is going 75 miles per hour. The first light line above means $75\frac{1}{2}$ miles per hour or 75.4 miles per hour.

The line at the bottom of the page for minutes and seconds is divided into half-seconds. If a car goes one lap in a time of 2 minutes $7\frac{1}{2}$ seconds, the chart will show that its speed is 70.6 miles per hour. By the use of this chart the times as announced or printed can be changed.

COMPILED BY DARWIN S. HATCH

TIME IN MINUTES AND SECONDS FOR 1 LAP - $2\frac{1}{2}$ MILES

1911—Ray Harroun

The First Sweepstakes



RAY HARROUN, 1911 WINNER

STATISTICS OF THE 1911 INDIANAPOLIS 500-MILE RACE

Position	No.	Car	Driver	Cyl.	Bore	Stroke	Piston displace	Time	M.P.H.
1	32	Marmon	Harroun	6	4 1/2	5	477.1	6:42:08	74.59
2	33	Lozier	Mulford	4	5 3/8	6	544.6	6:43:51	74.29
3	28	Fiat	Bruce-Brown	4	5	7 1/2	589.0	6:52:29	72.73
4	11	Mercedes	Wishart	4	5.1	7.1	580.2	6:52:57	72.65
5	31	Marmon	Dawson	4	4.5	7	445.3	6:54:34	72.34
6	2	Simplex	DePalma	4	5 3/4	5 3/4	597.2	7:02:02	71.13
7	20	National	Merz	4	5	5 1/8	436.8	7:06:20	70.37
8	12	Amplex	Turner	4	5 1/8	5	443.3	7:15:56	68.82
9	15	Knox	Belcher	6	5	4 3/4	559.1	7:17:09	68.62
10	25	Jackson	Cobe	4	5	5 1/2	431.9	7:21:50	67.90
11	10	Stutz	Anderson	4	4 3/4	5 1/2	389.9	7:22:55	67.73
12	36	Mercer	Hughes	4	4 3/8	5	300.7	7:23:32	67.62

Running at the finish, Firestone, Frayer; National, Wilcox; Mercer, Bigelow; Inter-State, H. Endicott; Velle, Hall; Benz, Knipper; Benz, Burman; Simplex, Beardsley; Fiat, Hearne-Parker; Pope-Hartford, Fox; Cutting, Delaney; Jackson, Tower; McFarlan, Marquette; Cole, W. Endicott.

Also started—National, Altken, 125; Case, Jones, 122; Case, Strang, 109; Apperson, Lytle, 82; Alco. Grant, 51; Buick, C. Basle, 46; Pope-Hartford Disbrow, 45; Buick, A. Chevrolet, 30; Fiat, Bragg, 24; Jackson, Ellis, 22; Lozier, Tetzlaff, 20; Amplex, Greiner, 12.

FORTY-SIX cars were entered in the first one of the international sweepstakes, run on the Indianapolis speedway in 1911. Of this number forty started, twelve finished, eleven others were running at the finish and seventeen dropped out for one reason or the other. The winner was Ray Harroun in the Marmon Wasp.

There were accidents in the race of course. You cannot put forty cars on a 2 1/2-mile track and travel at the rate of 75 miles an hour without something happening. The first mishap came early in the race when Arthur Greiner in an Amplex, turned over in his thirteenth lap, the accident killing his mechanic, Samuel Dickson. Teddy Tetzlaff in a Lozier and Disbrow in a Pope-Hartford came together in the homestretch and both were put out by the crash.

The most sensational mixup came be-

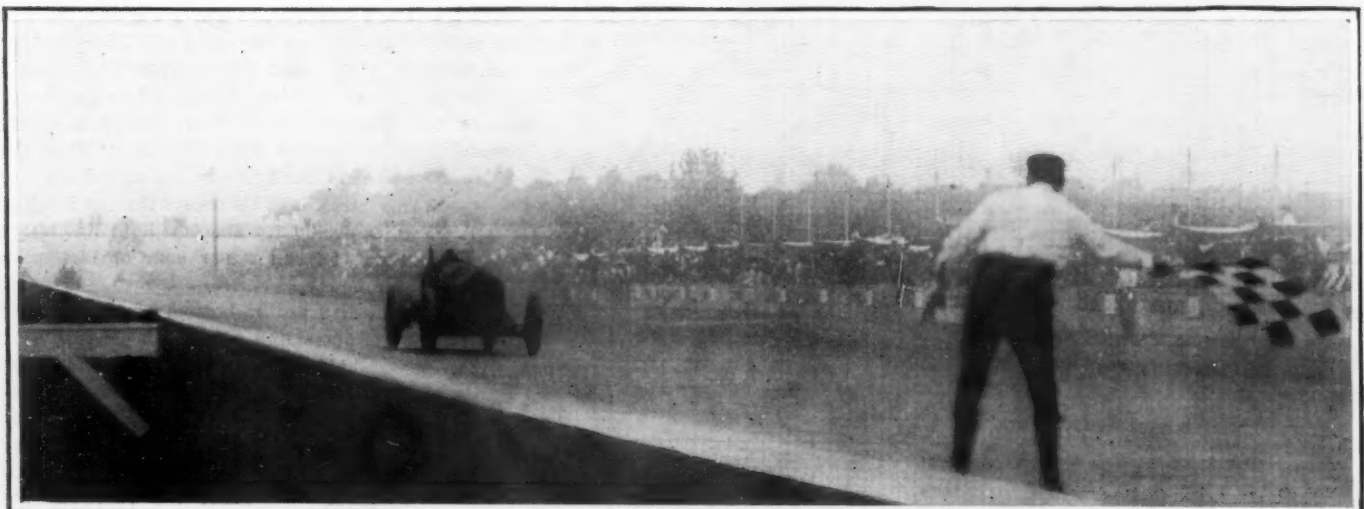
fore the race was half over. Near the pit Jagersberger's mechanic fell out of the Case while it was slowing and lay on the track where he was in danger of being hit by the other cars. Knight in a Westcott slapped on his brakes as he was passing and skidded to the pits, where his car

crashed into the Apperson Lytle was driving and which was taking on supplies. It was a miracle that no one was killed.

The winner received \$10,000 and the remaining eleven split \$15,000. The contesting cars were larger than those running this year, the limit being 600 inches.



RAY HARROUN IN THE MARMON WASP



HARROUN IN MARMON, FINISHING THE 1911 RACE

1912—Joe Dawson

The Second Sweepstakes

STATISTICS OF THE 1912 INDIANAPOLIS 500-MILE RACE

Position	No.	Car	Driver	Cyl.	Bore	Stroke	Piston displace	Time	M.P.H.
1	8	National	Dawson	4	5	6 1/4	490.8	6:21:06	78.7
2	3	Fiat	Tetzlaff	4	5	7 1/2	589.0	6:39:25	76.6
3	21	Mercer	Hughes	4	4 3/4	5	300.7	6:33:09	76.3
4	20	Stutz	Merz	4	4 3/4	5 1/2	389.9	6:34:40	76.0
5	18	Schacht	W. Endicott	4	4 3/4	5 1/2	389.9	6:46:28	73.3
6	2	Stutz	Zengel	4	4 3/4	5 1/2	389.9	6:48:31	73.2
7	14	White	Jenkins	6	4 1/4	5 3/4	489.4	6:52:38	72.7
8	22	Lozier	Horan	4	5 3/4	6	544.6	6:59:38	71.4
9	9	National	Wilcox	4	5	7 1/2	589.0	7:11:30	69.6
10	19	Knox	Mulford	6	4 5/10	5 1/2	597.16	8:53:00	56.2

Also started—Mercedes, dePalma, 198 laps; Cutting, Burman, 156; Mercedes, Wishart, 92; Simplex, Dingley, 155; Lozier, Matson, 107; Stutz, Anderson, 79; Marquette, Leisaw, 63; Case, Hearne, 54; Firestone, Rickenbacker, 44; National, Bruce-Brown, 25; Lexington, Knight, 7; Opel, Ormsby, 5



JOE DAWSON, 1912 WINNER

TWENTY-SEVEN cars were entered in the 1912 race; twenty-four started, ten actually finished, while the remaining

fourteen were eliminated by accidents. Joe Dawson, in the National, drove a consistent race and when de Palma broke

down in the 198th lap, he was in position to grasp the opportunity and beat Tetzlaff by more than 18 minutes.

De Palma had led the field from the very start and was averaging better than 81 miles an hour.

In marked contrast to 1911, there were few accidents. Only one approached the serious and that was the one which eliminated Bob Burman and the Cutting. Two rear tires blew out at the same time in the 390th mile and the Cutting turned turtle. Burman and his mechanic were scratched up a bit but neither was seriously injured.

For this race the prize money had been doubled, being jumped from \$25,000 to \$50,000, with the first prize \$20,000. The conditions were the same as in 1911—that is, it was open to cars of a piston displacement of 600 inches and under, whereas this year it is 450 and under.



JOE DAWSON IN THE NATIONAL



STARTER WAGNER FLAGGING DAWSON IN 1912 RACE



MOTOR AGE
Published Weekly by
THE CLASS JOURNAL COMPANY
910 SOUTH MICHIGAN AVENUE CHICAGO

NEW YORK OFFICE
239 West 39th Street

SUBSCRIPTION RATES
United States and Mexico
\$3.00 per Year
Other Countries including
Canada \$5.00

Entered as Second-Class Matter September 19, 1899, at the Postoffice at Chicago, Illinois, under Act of March 3, 1879

The Speed Cost

EVERYBODY is debating whether the average speed of the winner in the Indianapolis 500-mile race, to be run this week, will be as high as that of the winner last year, because this year the piston displacement of the contestants is a 450-cubic inch maximum as compared with a maximum of 600 cubic inches last year. In other words, the motors are one-quarter smaller than they were a year ago, and the question is, after losing 25 per cent of their motor capacity will the cars still be able to maintain a pace of 78.7 miles per hour?

IF such is possible, it must be interpreted that our engineers have been busy during the last 12 months, and it must be further interpreted that the driving cost will be less than that of a year ago. It is a certainty that a 450-cubic inch motor will not consume as much fuel in traveling 500 miles as a 600-cubic inch one, in spite of the fact that the crankshaft speed will be faster in the smaller motors than in the large. It also is certain that the tire wear on a 450-cubic inch car will be less than that on a 600-cubic inch car, because the cars will average less in weight. Reducing weight is a move in the right direction. Last year demonstrated that a light car can be built to hold the track as well as a heavier model. The ability of a car to ride smoothly along a road at high speeds is not entirely a question of avoidduois, but rather one of nicely balancing the weight over the front and rear wheels. Makers are going further than simply equalizing the load over the front and rear wheels, in that they have discovered there is an advantage in accurately balancing each of the four road wheels to the extent of placing a counter-weight on the rim opposite to the valve stem. Engineers of speed cars claim that by the careful balancing of the wheel the general vibration of the car is reduced, and the jumping of the wheel on the pavement considerably eliminated. It is these finer points in racing that are bound to demonstrate themselves in Friday's race.

IF the cost of a racing car can be reduced by various means on the Indianapolis speedway, then the cost of operating a touring car can, to an extent, be reduced along similar lines. It is not utopian to conceive the time when the four road wheels of a motor car will be as carefully balanced, or nearly so, as are the pistons and connecting rods of to-day. The owner is more and more turning his attention to the reduction of cost in touring. He wants his tire bills reduced, and if balancing of wheels can result in an appreciable reduction in cost, then he will insist on it. If the use of wire wheels will reduce the tire cost, then the buyer will demand them in spite of the fact that some interests are talking against them at the present time.

JUST as the engineer who has a car at Indianapolis is interested in increasing speed by various devices, to the same extent is the buyer interested in the reduced cost of upkeep. Buyers are becoming more rational in the selection of a motor car than they were 3 years ago. The increase in price of fuel has made them analyze the maintenance question as never before. The buyer is to-day demanding lower horsepower. He has not been as active on reflection of weight as he will be in the next year or so, because the manufacturer has been able to answer the weight question with the argument that the in-

creased weight of the car has been due to such additions as self-starters, demountable rims, extra equipment, etc., which the buyer had demanded.

IN Europe the question of spring action is receiving consideration to-day because some of the leading engineers have declared that the working of the spring has as much to do with the wear of a tire as any other factor connected with the operation of the car. One engineer has demonstrated this to his entire satisfaction. He has shown that with one spring the tire wear is considerably greater than with another. This opens an entire new channel in the field of cost reduction, and while American spring makers have been also investigating these questions, the subject has not received sufficiently general attention to bring about that investigation which it warrants. In these days not one stone should be left unturned which will work for the cause of reduced cost of car operation and maintenance.

The Human Battery

TO those owner-drivers who have grown accustomed to the use of the small ignition battery which they have been in the habit of having re-charged whenever the source of current got too low, the difficulty of giving due attention to the battery for starting purposes cannot be too forcibly impressed. The starting battery has a difficult role to play, much more so than the ignition battery, in spite of the fact that it is built to meet the requirements. The work of the two is quite different. With the ignition battery there is a constant and relatively low consumption of current, whereas with the starting battery there is an abnormal demand for current for a very short period of time. If the motor is started but three times a day then there is a demand for current but three times, whereas the ignition cell if used for running is supplying current constantly all of the time while the motor is in operation.

LET the driver using a car with an electric starter give as much attention to the storage battery as he does to seeing that his gasoline tank is filled or that the motor has enough lubricating oil. It is imperative that he give it such attention, otherwise he is sure to pay for his folly and neglect. It is not sufficient to have the battery looked after once a month, or once every 1,000 miles. It must receive weekly attention. The driver must get in the habit of testing the electrolyte with his hydrometer to see if it is of the proper strength, and he must also see to it religiously that the fluid in each cell is kept at the proper height.

IF he neglects these simple precautions he will find some day to his amazement that the battery does not give out its expected current. He will have it recharged and will further find that it will not hold the charge to the extent it originally did. He will find, as many have, that a replacement may be necessary—in fact, imperative. He will find that the fault is all his. The battery was designed for starting purposes. It was designed to give off a great volume of current at short intervals, and that to keep it in good condition under such strenuous service it is imperative to give it regular attention. Again, the owner-driver must get in the habit of giving the battery weekly attention.

The Breaking of Ramsey

by J.C. Burton.

IF the close corporation of Fate, Kismet, Destiny & Co.—breaker of kings and maker of queens, comic opera and divine right—has a trade-mark, it reads

“We’ll Get You Yet.”

Although grammatically incorrect and sounding as if written by a cabaret bard, this catch line, you must admit, has the saving virtue of veracity. For a trust that seems to have adopted a Fabian policy of doing business, Fate, Kismet, Destiny & Co. has an enviable reputation for delivering the goods ultimately. All shipments are made via the Achilles Heel route, “through transit guaranteed.” (See advertisements in Mythological Railway Gazette.)

Had anyone told you 5 years ago that “Regal Ray” Ramsey was yellow, you would have denounced your informer with Rooseveltian diplomacy—were he bigger than you—as an Ananias Club member. Otherwise, you would have called him a liar and covered up, preparatory to facing the Marquis of Queensbury consequences. Five years ago the favored offspring of the Mercury-Atalanta alliance (consult the Olympian license records for verification) was a proverbial Titan, defying the gods of speed, wind resistance, projectile laws, plane angles and other scientific allies of the divine Velocitas family.

But “Regal Ray” Ramsey yellow? Impossible! There are other colors, both primary and secondary, that might have been associated with him—the healthy tan of his swarthy skin, the glistening black of his closely-cropped hair, the friendly blue of his cunning eyes, the satisfying red of his innumerable victories, the deep purple in which he was bred, the pink of condition which newspaper reporters invariably said he was in—but cowardly yellow, never!

Idolized by red-blooded men whose hearts beat fast when the starting bomb explodes and the roaring monsters of steel are sent away, Ramsey was the king of American race drivers, a title he defended against the stubborn but futile challenges of the speed potentates of France and Italy. His was a throne of public worship, a throne which he abdicated one August afternoon, 5 years ago, to retire to the Elysium Fields of all modern heroes—Obscurity.

Your hypothetical informer, mentioned in the third paragraph, may have been right. “Regal Ray” Ramsey may have been yellow. That is for you to judge, after reading the testimony about to be submitted. All that I know is, that Ramsey quit, and quit cold, quit with the sweat of terror on his brow, the pallor of fear on his cheeks and the blue of horror on his lips.



“But ‘Regal Ray’ Ramsey yellow? Impossible!”

If you witnessed the Hempstead road race—it was run August 5, 1908, and won by Trancia—you will remember Ramsey’s disgraceful abdication until the day Life waves the checkered flag for you. You will recall, with the minimum mental effort, how he rolled up to the white pits on the twelfth lap of the thirty-six lap race, jammed down his brakes and leaped from his car. His legs shook with coward’s ague. With a curse and two wild blows, he broke away from his cowering mechanician, his frantic manager and bewildered helpers.

Perhaps, if you are imaginative, you heard the scratching pen of one of Fate, Kismet, Destiny & Co.’s bookkeepers as he made an entry in the firm’s obese stock book, for at 2:10 o’clock on the afternoon of August 5, 1908, the steel nerve, the lion’s heart, and the heretofore unattainable goat of “Regal Ray” Ramsey, became part of the assets of Fate, Kismet, Destiny & Co. At least, it is so set down in the Court of Inevitable Record.

Whether or not Fate, Kismet, Destiny & Co. was solely responsible for the breaking of Ramsey is but partially relevant at this time. It is enough that Ramsey was broken and his legion of admirers broke—which is more pertinent to the First National Bank—for “Regal Ray,” when he was sent away with motor barking petulantly and 50,000 paying vociferous homage, was a 2 to 1 favorite and backed heavily by sportsmen who ignore hunches and are influenced only by past performances in laying their bets.

Now there was something mysterious, something almost uncanny, in the breaking of Ramsey. Had a Sherlock Holmes or a Monsieur Lecocq been put on the case, these eminent detectives undoubtedly would have applied several theories and, by processes of deduction and elimination, reached a conclusion vindicating “Regal Ray,” but failing to compensate several thousand sportsmen for financial losses suffered when their idol turned yellow from fright. In order to get our narrative in the high speed, it might profit us to adopt the methods of Sir Conan Doyle’s creation, eliminating, of course, the morphine hypodermic and the selection of the soothing Stradivarius.

My dear Watsons, we may find something of interest in the public prints. Here is a clipping from the New York Times that looks promising:

Hempstead, Aug. 3.—While tuning up his car for the Hempstead road race, Bob Byrne, the Benz driver, skidded on Charon’s curve today and was instantly killed when the powerful machine turned turtle and crashed into the trees and dense clump of bushes that fringe the outside edge of the tortuous turn.

At the time of the fatal accident Byrne was engaged in a friendly speed duel with “Regal Ray” Ramsey, winner of last year’s Vanderbilt and favorite in Friday’s contest. Byrne had passed him on the homestretch and in his desire to maintain the lead failed to shut off soon enough on taking the corner. He paid for his folly with his life.

That Byrne was a fatalist was brought out at the coroner’s inquest this afternoon when Ramsey testified that just before beginning practice this morning, Byrne had said to him, “Ray, this is a game you can’t beat. You’re bound to finish in an ambulance.”

Linked with the story that Ramsey told me but a year ago, this clipping furnishes an interesting clue.

“I’m done!” he shrieked, when I asked him if there was any truth in the report that he was thinking of attempting to regain his lost laurels. “I’m done,” he reiterated. “I was wise enough to quit before I got busted up or killed in a smash.

“You may think Mattewan is the place for me when I’ve told you why I quit in the Hempstead road race, but I’m not bugs. I’m as sane as I ever was when I was chasing after silver-plated junk and prize money. I’m telling you the truth, Coburn, and if you don’t believe me, ask my mechanic, Joe Kelly. He’ll tell you the same story. He ain’t pumping oil no more. He heard the call, too, Bob Byrne’s

call. He quit when I did—and the racing camps never knew a gamer kid.

"I know that they said a lot of nasty things about me when I quit, but it ain't no disgrace to turn yellow when you know you're marked.

"You never saw a guy cash in, did you? If you did, you'll never forget it. No matter how game you are, it'll get your nerve, for a time at least. Now, I saw Bob Byrne die. I was chasing the poor devil when he hit the loose dirt, when his cart turned over and he was tossed against that big elm tree that stood at Charon's curve. Me and Joe picked him up that day. I can see him now, his face covered with blood and both arms and legs broken."

Ramsey stopped and coughed. His face was white, white as chalk.

"The day before the Hempstead race," he continued, "when I was trying out my rig for the last time, I didn't take no chances on Charon's curve. I shut off every time I went into it, and, believe me, I took it low. Once when I was rounding it, a falling leaf brushed my cheek. It was warm, warm as a drop of Bob Byrne's blood. Joe said there still was blood on the trunk of the big elm tree, but I didn't see it. Joe always was strong on imagination.

"I tried to forget Byrne that night, but I couldn't. Just to get my mind off him and next day's race, I got into a stiff crap game with some of the other drivers, but every time I rolled Big Dick I thought of Byrne. Ten—that was his number. About 2 o'clock Friday morning I woke with a start, shaking all over and my body wet with sweat. I thought that Byrne was chasing me, chasing me in a transparent white car with a skeleton sitting in the mechanic's seat. I didn't go back to bed again. I was afraid I would have another dream like that.

"I drew No. 11 in the Hempstead race. You remember, I was slow in getting away, that I killed my engine shifting gears. Well, when Wag was counting for me, I couldn't get it out of my mind that he wasn't giving Byrne, who had No. 10, the word. Not until Wag slapped me on the back did I come to my right senses. Then I was so nervous I stalled my motor, Joe cursing as he leaped out of the rig to give her another crank and Wag shouting at me to hurry up.

"I was still leary of Charon's curve.

The first two times around I hit it low, with my throttle way down, shutting off to 25 miles just before going into the turn. I was beating it on the straight-aways, though, and had almost caught La Mauppa, the Frenchman, who was setting the pace, when I came down the home stretch for the third time.

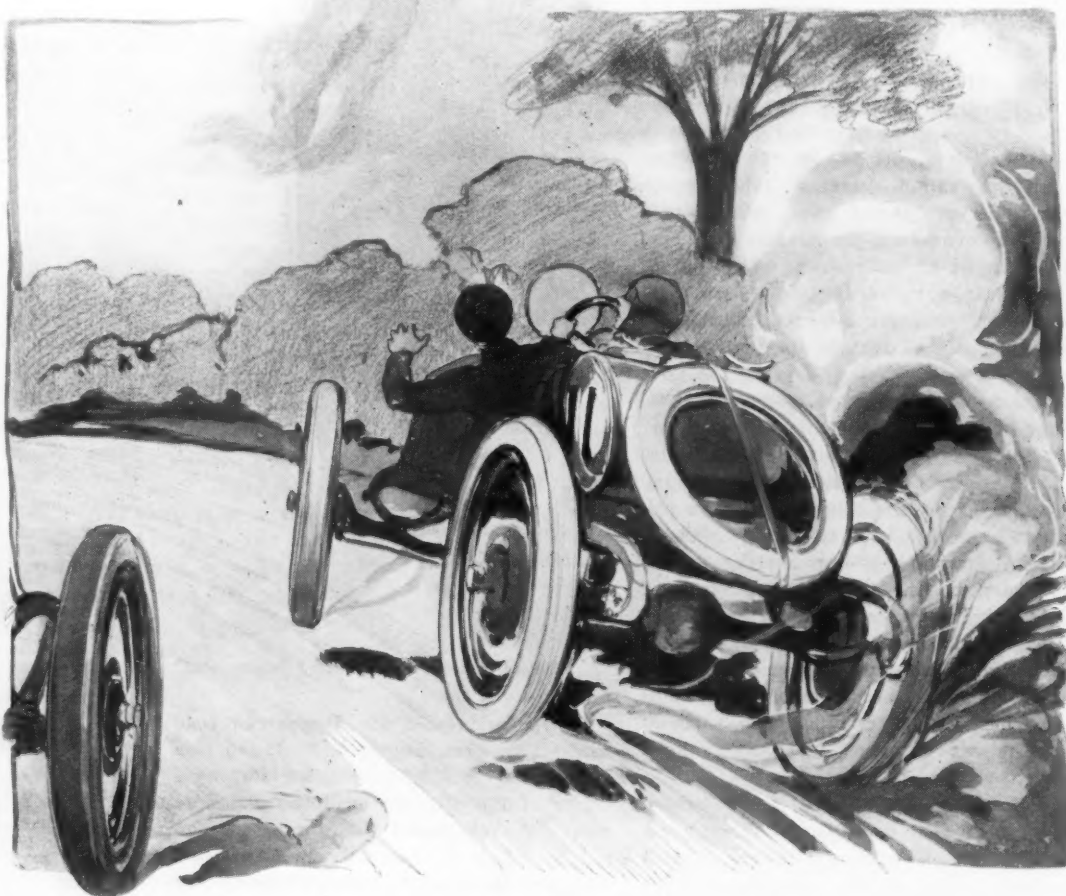
"I thought he would increase his speed and try to shake me off, but he didn't. At Charon's curve he slowed up and gave me the right of way, swinging down to the inside and giving me room to pass on the

was on his blanched face. He swallowed hard twice before he continued:

"The next three times I went into Charon's curve, the same voice moaned, 'Ray, this is one hell of a game!' Joe heard it too,—I knew it by the way he first looked at the bushes and then at me. I could not escape it. Bob Byrne was calling me.

"Then I started to fight myself. I felt my nerve going and I became desperate. The seventh time I hit Charon's curve I heard the whining voice again, but it scudded a warning,—'You can't beat it. You can't beat it. You can't beat it.' I can hear it to this day, low and blood-chilling.

"The rushing wind that pounded against my ear drums, the barking motor that was hitting as even as you could wish, seemed



"The rushing wind that pounded against my ear drums, the barking motor that was hitting as even as you could wish, seemed to echo that cry of the ghost of Bob Byrne"

outside corner. Just as my front wheels cut into the loose gravel of the outer edge, I heard, above the roar of the motor and the bark of the exhausts, a wailing voice saying, 'Ray, this is one hell of a game!'

"That was what Byrne said to me the morning he took the wheel for the last time. With trembling hands, I pulled into the center of the road, and yelled to Joe, 'Did you hear that?'

"'Hear what?' he hollered back.

"I didn't answer, thinking I was only hearing things. That it was just imagination on my part."

Ramsey stopped again. Perspiration

to echo that cry of the ghost of Bob Byrne, 'You can't beat it.' Above the raucous roar of the speed bugs I heard it. It trailed me as I tincanned over the back stretch, swept around two more turns and thundered past the cheering grand stand."

Ramsey closed his eyes as if to blind himself from memory's terrifying vision. Then he stared at me, hoping to find a sign of credulity in my face.

"There was an even more foreboding note in the wailing warning when I went into Charon's curve on the next lap. The voice was high-pitched and shrill. It seemed to come from some place above. I

looked up. There, floating above me, was the figure of a man in gray mist,—the spirit of Bob Byrne.

"Look out, Ray," Joe shrieked.

"Then the left front wheel dropped into the ditch. I had to fight the car with all my strength to keep it from overturning. When I got her on the road again and looked up, the cloud was gone.

"My face was wet and sticky. I thought it was blood. It was sweat, sweat that dropped off my greasy forehead, nose and cheeks onto my jacket.

"Again I passed the grand stand. Again I shot into Charon's curve. Again I heard the ominous cry, 'You can't beat it,' and saw the spirit of Bob Byrne hovering over me. On three more laps I saw it floating above my car, to disappear into nowhere. My body was first hot, then cold. The blood beat against my temples with the force of a trip-hammer.

"I'm going to quit, Joe," I yelled, as we started on the twelfth lap. "I'm going to quit after this round."

"As I shut off to take the corner, I swore I wouldn't look up again. I didn't want to see that gray thing. I kept my eyes fastened on the radiator cap until Joe shouted, 'My God, look!' and pointed to the clump of bushes through which Bob Byrne had been thrown 2 days before. They were red, red with blood, Bob Byrne's blood!

"I closed my eyes. I didn't care whether we went off the road or not, just so I didn't see that red again. As I felt for the clutch, I heard the wail of Bob Byrne's ghost, 'You'll finish in an ambulance.'

"I don't know how I ever drove those last 6 miles around the course to the pits. My hands were numb and I shook from fright. But I said I'd quit, and I quit; and the best man on earth couldn't have persuaded me to go on. Bob Byrne called me, Coburn, and when a dead man calls you, it's best to heed his warning."

For 5 silent minutes Ramsey and I stared at one another—he, hopeful that I would believe him; I, in amazement.

"I guess you did the wise thing," I said, and walked away.

The night before the historic Hempstead road race was run, Al Mason advised me to hedge on my Ramsey bets and plunge on Trancia at odds of 8 to 1. I thought that Mason—he was the Italian's manager—was prejudiced, and only laughed at his tip. To my sorrow, I found out he was wise. Mason cleaned up a small fortune on that race. How much no one ever knew, but it was rumored around the racing camps that his winnings totaled \$50,000.

Didn't you ever hear of Al Mason? He put the "Oh!" in



"I thought Byrne was chasing me in a transparent white car with a skeleton sitting in the mechanic's seat"

hippodrome. His specialty was thrilling the rubes. With a stable of three big cars and a hybrid known as the "Crimson Cyclone," he swung around the dirt track circuit each season, featuring Trancia as a headliner and claiming world's records clocked with a stop-watch geared up so high that it covered 50 seconds in a minute. When turf racing was the sport of kings instead of the sport of law-makers, Mason had a string of maidens that ran true to form one day and blew the next, and many were the times he was called up before the stewards to explain. He became an impresario of dirt track meets after discovering that, as a theatrical manager, he didn't have a chance with Belasco and Frohman. He may have had a paucity of scruples, but acquired quite a bank roll—and that's what counts in the long run, these days.

When Mason entered Trancia in the Hempstead classic, no one thought he was after the prize money. "Al is seeking publicity" was the way the wise ones ex-

plained it. For that reason, the breaking of Ramsey and the triumph of Trancia was a double surprise.

Now, on the corner of Main and Elm street, Hempstead, next to the Commercial hotel, is an antique drug store. Old "Doc" Holmes, kindly, thin and 60, is soda-water boy, prescription clerk and proprietor of the sluggish establishment where the ring of a cash register is unheard. Although not a progressive merchant, the veteran apothecary of Hempstead keeps close account of his receipts and expenditures, and has a wonderful memory. Should you question him about a particular sale made on August 4, 1908, he would thumb the pages of a dusty cash book and, after rubbing the lens of his gold-rimmed spectacles and eyeing the cryptic notations at close range, reply:

"Yes, I did sell a can of red paint and a package of flashlight powder to one of those racin' fellers that day. It came to a dollar an' one quarter. I think I recollect his name. It was Mason—or something like that."

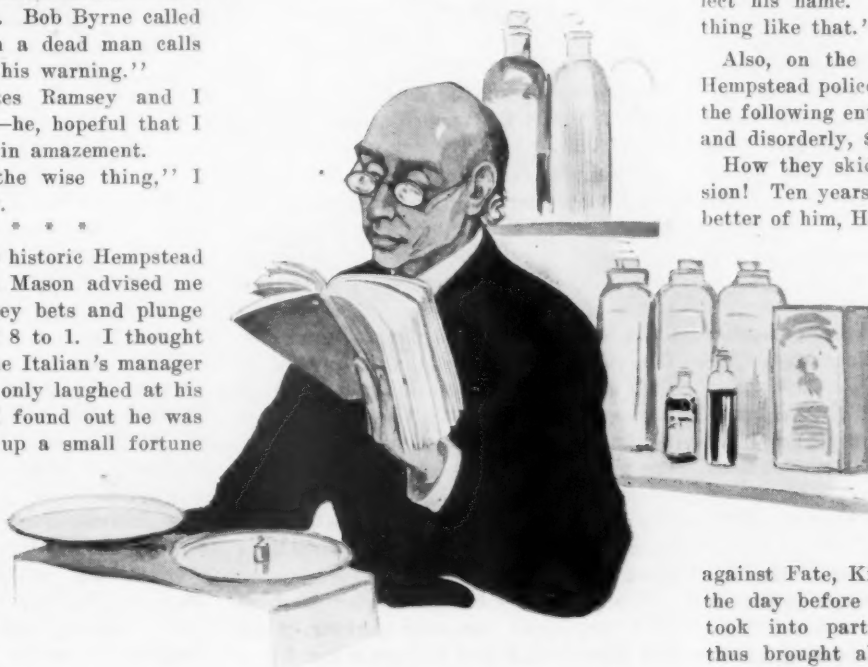
Also, on the August 6 blotter of the Hempstead police department you will find the following entry: "Henry Allen, drunk and disorderly, \$5 and costs."

How they skid in the theatrical profession! Ten years ago, before drink got the better of him, Henry Allen was booked for big time in vaudeville as the "Viennese Ventriloquist."

Now I may be wrong, but I think that the red paint, the flashlight powder and the \$50 fee paid to Henry Allen—ventriloquist—by Al Ma-

son should be charged

against Fate, Kismet, Destiny & Co., who the day before the Hempstead road race took into partnership Superstition, and thus brought about the downfall of the great American road race driver, "Regal Ray" Ramsey.

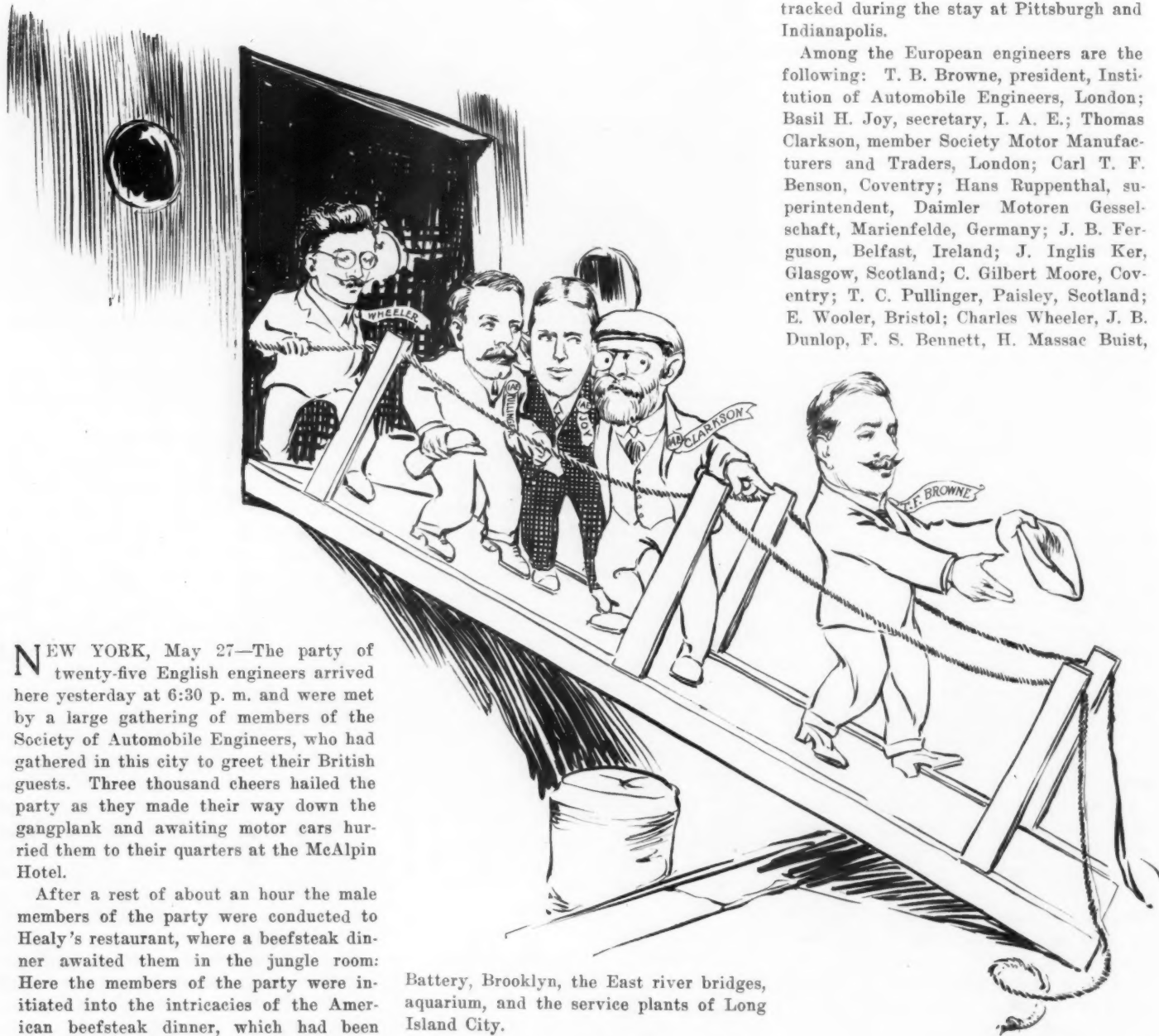


"The veteran apothecary of Hempstead keeps close account of his receipts"

English Engineers Visiting America

tracked during the stay at Pittsburgh and Indianapolis.

Among the European engineers are the following: T. B. Browne, president, Institution of Automobile Engineers, London; Basil H. Joy, secretary, I. A. E.; Thomas Clarkson, member Society Motor Manufacturers and Traders, London; Carl T. F. Benson, Coventry; Hans Ruppenthal, superintendent, Daimler Motoren Gesellschaft, Marienfelde, Germany; J. B. Ferguson, Belfast, Ireland; J. Inglis Ker, Glasgow, Scotland; C. Gilbert Moore, Coventry; T. C. Pullinger, Paisley, Scotland; E. Wooler, Bristol; Charles Wheeler, J. B. Dunlop, F. S. Bennett, H. Massac Buist,



NEW YORK, May 27—The party of twenty-five English engineers arrived here yesterday at 6:30 p. m. and were met by a large gathering of members of the Society of Automobile Engineers, who had gathered in this city to greet their British guests. Three thousand cheers hailed the party as they made their way down the gangplank and awaiting motor cars hurried them to their quarters at the McAlpin Hotel.

After a rest of about an hour the male members of the party were conducted to Healy's restaurant, where a beefsteak dinner awaited them in the jungle room: Here the members of the party were initiated into the intricacies of the American beefsteak dinner, which had been discussed frequently during the voyage. It is even stated that the members of the party persuaded the captain to closely approach the record day's passage of the Minnewaska, in order to get the party to New York in time for the affair.

At the conclusion of the dinner speeches of welcome were made by Toastmaster Anglada, President Marmon, P. D. Wagner, H. M. Lloyd and C. W. Spieer, the members of the New York committee and the general committee, to which Messrs. Brown, Joy, Clarkson and Wheeler responded with an expression of appreciation for their hearty welcome.

The party assembled again at the McAlpin hotel at 8:30 this morning and in spite of the drizzling rain and raw wind enjoyed a motor trip around the city. During the forenoon the fifty-five-story Woolworth building was visited as well as the

Battery, Brooklyn, the East river bridges, aquarium, and the service plants of Long Island City.

During the forenoon a visit was made to the headquarters of the S. A. E. in the United States Rubber building. While here a number of valuable souvenirs were presented by different accessory manufacturers.

At the conclusion of the morning's run the party assembled at the Automobile Club of America, where a buffet luncheon was served. Owing to the bad weather the baseball game had to be omitted from the program and trips to local points of interest made instead. The New York city fire department had promised a drill to exhibit the working of the metropolitan apparatus.

The program calls for a stay in New York until 9:25 tomorrow morning, when the party will board the train for Pittsburgh, two special cars having been set aside for their use and these will be side-

J. A. Prestwich, E. C. Paskell, London; E. B. Wood, Bristol; L. Bollack, Coventry; C. A. Branston, Cambridge; Tom Norton, Llandrindod Wells; R. W. Smith, Redditch.

The semi-annual meeting of the Society of Automobile Engineers will, as was the case last year, be held on board a steamer cruising the great lakes. Four professional sessions will be held on June 5-6-7, the party leaving Detroit on the City of Detroit III. The Englishmen will be in this party.

In Indianapolis the chief point of interest for the visitors will be the 500-mile international sweepstakes race. In Detroit the manufacturing plants of the Ford, Cadillac, Packard, Timken, Hudson, Continental motor, and Chalmers companies will be visited. The formal feature of the whole program will be the banquet

held at the Hotel Pontchartrain on the evening of Tuesday, June 3.

In Cleveland the party has been extended a welcome to the Peerless, White and Winton plants. Some of the engineers will make a side-trip from Cleveland to Akron to inspect the Goodyear tire factory. In Buffalo the entertainment of the entire day will be provided by the Pierce-Arrow company. In Providence the hosts will be the American Locomotive Co., Brown & Sharpe and Potter & Johnson. In Bridgeport visits will be made to the Locomobile Co. of America and the Spring Perch Co., the Locomobile company being the host at luncheon. After a motor car drive to New Haven, the works of the New Haven Carriage Co. will be inspected.

The next and last city visited before returning to New York is Hartford, where the plants of Pratt & Whitney, Pope Mfg. Co. and Hartford Rubber Works Co. will be open.

STRIKES IN FOREIGN FACTORIES

Paris, May 12—Trouble has broken out again among the workers in the French motor car factories with regard to what is known as the English week. For some time past there has been a strong movement towards the closing of the factories

tory gendarmes and soldiers have been called out.

Practically all the Italian factories have been closed for the last 60 days, the workmen asking for an increase in wages which the manufacturers refuse to grant. Altogether 8,000 workpeople are affected, the shops closed by reason of the strike being Itala, Fiat, Isotta-Fraschini, Bianchi, Aquila, Storero and Spa.

CHICAGO-BOSTON RUN POSTPONED

Chicago, May 27—The Chicago Automobile Club today announced the postponement of its Chicago-Boston day and night non-motor stop reliability sched-

will allow its two entries to stand. Other entrants are expected to do likewise.

SUNDRY MEN TALK OWN SHOW

New York, May 27—Special telegram—The question of whether the interest of the Motor and Accessory Manufacturers would best be preserved by participating in the 1914 Grand Central Palace or conducting a separate show at Madison Square Garden, an option for which has been taken by the M. and A. M., busied the members present at today's meeting of the board of directors. If a majority of the members, among whom the vote now is being arranged, are in favor of a separate show, the garden affair will be held at the same time as the palace show of the Automobile Chamber of Commerce. The situation in Chicago will remain as before, so far as can be seen now, the M. and A. M. expecting to participate in the show in the Coliseum Annex and First Regiment Armory.

MISSISSIPPI TAG LAW VOID

Jackson, Miss., May 27—Special telegram—Mississippi will have to refund the \$30,000 in motor license fees that have been collected during the past year. The supreme court of the state yesterday ruled the license unconstitutional. The fight against the law was conducted by the owners of motor cars in the state, who subscribed the funds necessary for the legal procedure which had been in the courts since the law went into effect. In the lower court the tax was declared unconstitutional and this finding was sustained by the supreme court. The ruling states:

Any clearly unnecessary expense imposed is unreasonable and its imposition is an arbitrary exercise of governmental power. The only regulation contained in this statute is that the motor car be registered and numbered. The expense necessary to be incurred in registering and number a motor car is less than \$1, but the amount that the statute desires to collect, in order that it may be reimbursed therefor, varies from \$5 to \$25, according to the horsepower of the engine by which the car is propelled.

It follows from these views that the statute is void under the due process clause of the state and federal constitution.

Motor car owners are greatly elated over their victory. James R. McDowell, formerly the attorney-general of the state, is being congratulated on the able manner in which he conducted the defense.

The legislature will have to vote a special appropriation covering the expenditures that have been made for license tags.



S. A. E. COMMITTEE GREETES ENGLISH ENGINEERS

on Saturday at noon, as is done throughout practically the whole of England. This has been done in a few of the factories, among them being Delaunay-Belleville, Hotchkiss, Gnome aviation motor works and Goodrich tire factory.

The present discontent began with the bodymakers, such leading firms as Belvalette, Labourdet, Rothschild, etc., being affected. It spread to the body working department of Bayard-Clement, and from there has spread to the engineering section. A large number of the workmen at the Bayard-Clement factory are now on strike. The Delage factory was affected to a slight extent, but after an explanation by the owner the question was submitted to a private vote and a small majority decided against a strike. In view of pos-

uled for June 25-29, until the latter part of October. This action was brought about by the desire to have a stock car class, which the American Automobile Association cannot take care of at the present time because no arrangements have been made for registering the cars. Chairman Schimpf, however, hopes that by fall he will be ready for this. The Chicago Automobile Club has discovered that the prominent manufacturers are insisting on a stock car division, it having been promised entries by the Packard Motor Car Co., the Lozier company and several others which have been out of comparable disorders at the Bayard-Clement fac-tition for several years, if a stock car division is added to the run. The Staver company already has announced that it

ADD TO BIG PLANTS

Expansions Planned by Two Detroit Car Concerns

CHALMERS ENLARGING

Ford Announces Additions to Already Big Factory

TO INCREASE 1914 OUTPUT

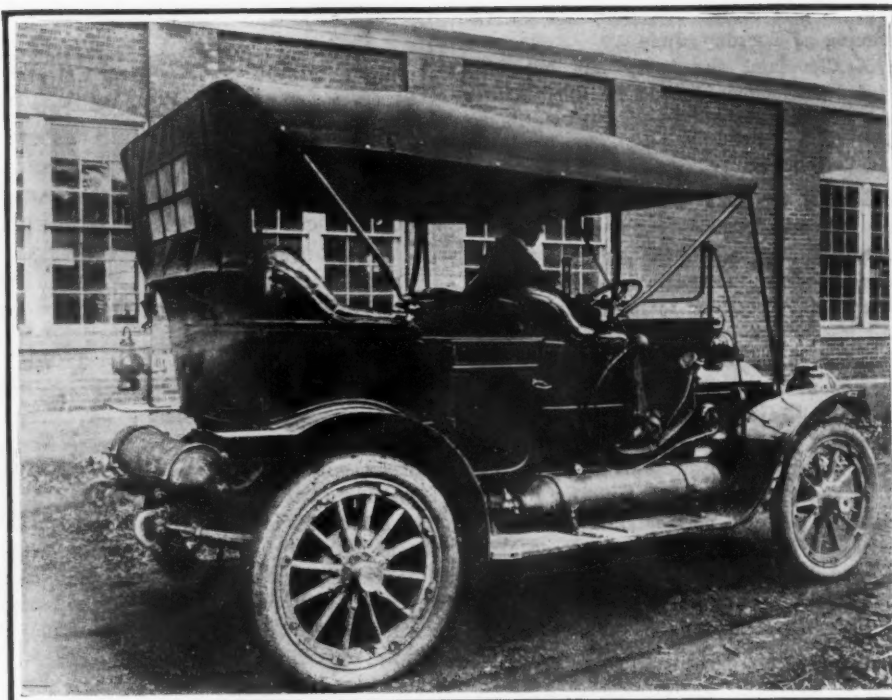
DETROIT, Mich., May 26—The large Chalmers Motor Co. plant on Jefferson avenue is to be further enlarged by the addition of another wing measuring 220 feet in length and 60 feet wide. The added floor space will be about 50,000 square feet, the structure being four stories in height, according to the plans. The new building will be made of concrete and steel and the ceilings will be flush. That is, there will be no exposed beams. In-closed bridges of steel will connect each floor with those of the adjoining building. With the completion of this latest addition the Chalmers company will have added some 200,000 square feet of floor space to its already large plant within the last year, and it will bring the total expenditures for additions and improvements to plant during that period to \$400,000. Five other structures have been added ranging from one to four stories in height as well as extensions to other departments.

Although it has been common property in Detroit for some time that the Ford Motor Co. was contemplating the further enlargement of its plant in Highland Park, which is already the largest in the world by a considerable amount, the exact nature of the extensions has just been made public. Work on additions which will make possible the increasing of production by a third is to be started at once.

According to a statement emanating from the general offices of the Ford company, the additions will increase the total floor space from 1,270,062 square feet to 1,794,974 square feet, or about half a million square feet. The new factory buildings, each six stories in height and measuring 60 feet in width by 900 feet in length are to be erected, the plans being prepared under the supervision of the company's consulting engineers.

The new buildings will extend eastward from the present main building, one north of the plant and fronting on Manchester avenue and the other running parallel to it and beyond a craneway having a width of 60 feet. The buildings in architectural design and construction will correspond with the existing buildings, being made of concrete and red brick. The windows will be equipped with steel sash and in all respects will be up to the present day ideas of fireproof construction.

Craneways, which will be under a glass roof, will extend the length of the struc-



PACKARD FITTED TO RUN ON LIQUIFIED GAS

tures and will afford a means of trans-ferral of parts or other material from any point in the factory to any other.

The additions will mean much to Detroit, as they will make necessary the employment of several thousand more men, which will probably swell the total number to around 16,000. There are at present about 14,500 employed by the concern.

In addition to the extensions of the plant proper, two stories are to be built onto the office and administration building in front of the plant, and material extensions to the Ford sales and service station located at the corner of Woodward avenue and Grand boulevard are also planned. Five stories more are to be added to the latter, while its frontage on Woodward avenue is to be increased from 100 to 321 feet. The depth of this building is 97 feet.

No statement as to the manufacturing plans for next year has yet been made, but it is probable that the production of Fords, which this year will reach 200,000 in all probability, will be increased greatly.

U. S. L. STRIKE SETTLED

Niagara Falls, N. Y., May 27—The strike in the plant here of the United States Light and Heating Co., which started on March 2, was settled last Friday afternoon, and yesterday morning 1,700 strikers returned to their places in the north end concern. The settlement was reached when Superintendent Engel, of the plant, agreed to reinstate all men who had been discharged because they were affiliated with labor organizations and those who voluntarily went on strike 3 weeks ago. Before the strike the company offered its employees a 9-hour day with 10 hours' pay or a 10 per cent increase in wages for

a 10-hour work day. The men decided to return to work with a 9-hour day with the same wages they formerly received for 10 hours and no new men will be employed until all the strikers have been reinstated. The strikers demanded the abolition of piece work, but this matter was not settled, it being placed in the hands of a committee of employees and Superintendent Engel for further discussion. The United States Light and Heating Co. has a branch factory at Pittsburgh and that plant has been operated at its utmost capacity during the strike to fill as many of the orders on hand as possible, but no new orders were taken during the strike.

DECIDES AGAINST STEPHENSON

Milwaukee, Wis., May 26—Judge W. J. Turner, of the circuit court of Milwaukee county, finds in favor of the defendants in a decision handed down today in the suit of the Stephenson Motor Truck Co., of South Milwaukee, vs. the J. I. Case T. M. Co. and Pierce Motor Co., of Racine, for \$100,000 damages on the claim of breach of contract. The findings of Judge Turner in favor of the Case and Pierce concerns is virtually a dismissal of the suit. The costs are taxed against the plaintiff.

The Stephenson Motor Truck Co., of Milwaukee, with works at South Milwaukee, entered into an agreement with the J. I. Case T. M. Co., of Racine, which had at that time effected an affiliation with the Pierce Motor Co., and since absorbed this concern, to purchase its entire output of delivery cars for a certain period, at the end of which the Stephenson company was to be purchased by the Case company under certain conditions. By this means the Case company virtually became a factor in the motor delivery car field, having previously entered the passenger car field

as marketer of the output of the Pierce Motor Co.

However, the Stephenson product did not come up to the expectations of the Case company, and when the time came for the consummation of the agreement, the Racine concern refused to proceed, claiming that the Stephenson company's product was not up to specifications. Upon the Case company's refusal to purchase the Stephenson company the latter brought suit to enforce the agreement and asked for \$100,000 damages, due to the loss of business and inability to market its own product because of the arrangement with the Case company.

RULES AGAINST SEARCHLIGHT

Indianapolis, Ind., May 26 — In the United States court here last week Judge Albert B. Anderson handed down a decision in the suit brought by the Prest-O-Lite Co. against the Searchlight Gas Co., in which an injunction to prevent the refilling of Prest-O-Lite Co. by the Searchlight company was asked, together with an accounting and damages.

Judge Anderson issued a permanent injunction, enjoining the Searchlight company from refilling the Prest-O-Lite tanks before the Prest-O-Lite name plate has been removed. He denied the accounting and damages that were asked.

Milwaukee Concern Bankrupt

Milwaukee, Wis., May 24.—The Yale Mfg. Co., of Oostburg, Wis., manufacturing motor car accessories and specialties, has filed a voluntary petition in bankruptcy, giving its liabilities at \$27,272.76 and assets at \$29,326.95. The company was organized about 3 years ago by Milwaukee capital and established a workshop at Oostburg, Sheboygan County. Headquarters are at 214-220 West Water Street, Milwaukee.

Stockholder Given Verdict

Milwaukee, Wis., May 24.—C. C. Tripp, of Fond du Lac, Wis., was given a verdict of \$1,000 against J. W. Foster and R. G. Bates in his suit charging that Foster and Bates had wilfully sold stock in the now defunct Bates-Odenbrett Automobile Co. of Milwaukee when they knew the stock was valueless. Tripp claimed he was led to invest through misrepresentation at a time when the company was approaching insolvency.

Another Detroit Concern

Detroit, Mich., May 24.—Incorporation papers were taken out by the Wahl Motor Co. on May 15. The capital stock is \$85,000, and the incorporators George G. Wall, A. M. Dodge, Michael Kratchwill, W. J. Heckish, E. E. Evans and T. M. Lemon. The concern is to manufacture a motor car, the specifications and price of which have not yet been disclosed.

LIQUID GAS AS FUEL

A. M. Schenk Invents New Process for Motoring Use

STORED IN STEEL TANK

Engines Run on Natural Gas at Small Cost Compared with Gasoline

BIG MILEAGE IS PROMISED

CHICAGO, May 24.—To run motor cars on gas carried under pressure on the running board or some other accessible location instead of using gasoline is the prospect offered by a new process of liquifying natural gas. The economy of natural gas as a fuel for gasoline engines long has been recognized; in fact, this is the fuel employed for testing purposes in many of the motor car factories in Detroit. The difficulty has been in utilizing the gas in a power plant that is not stationary.

A system of compressing natural gas to a liquid and storing it in this form in tanks resembling those used for lighting acetylene lamps has recently been developed by Albert M. Schenk, president of the Packers Motor Truck Co., Wheeling, W. Va. By his process the natural gas as it comes from the wells is liquefied and stored under a pressure of 50 pounds per square inch in steel tanks. It is found that this liquefaction removes most of the impurities from the gas so that it emerges from the tank practically a pure fuel.

In application, the tank is a simply connected by an expansion chamber to the ordinary carburetor and the fuel is admitted to the engine and used in precisely the same way as gasoline is used. The inventor has been working for 3 or 4 years on the process and has conducted quite extensive tests. Several cars have been fitted with the tanks, among them, two trucks, one Packard touring car and a Ford.

At present the cost of liquefaction and storing is \$.05 per thousand cubic feet of free gas, and it is stated that in tests on the speedway at Indianapolis, Ind., the Ford car ran 100 miles on less than 300

cubic feet. Each tank as now arranged holds about 600 cubic feet of free gas at a pressure of 50 pounds, but it is expected to double the pressure and the mileage per tank under improved methods of manufacture.

In general, the expectation of the backers of the new process is to sell the liquefied gas at a price that will make the cost per mile one-half that of gasoline. It is expected to establish refilling stations through the country so empty tanks may be exchanged for full ones in much the same way that lighting tanks are exchanged.

At the present time the regular carbureters are used, but experiments are under way toward dispensing with the carburetor. One of the claims made for the fuel is that it is clean, leaving no noticeable deposit. Patents for the process have been granted and applications have been made for others. For this reason no details of the method of manufacture can be given at this time.

VAUGHAN CAR CO. FORMED.

New York, May 26.—The Vaughan Car Co., with its factory located at Kingston, N. Y., will build a six-cylinder car—the Vaughan—which is in the \$2,000-\$2,500 class. A production of 500 cars is planned for 1914. The officers of the new company are: A. B. Corder, president; Orlando Weber, vice-president and general manager; H. W. Johns, treasurer; Ernest S. Partridge, secretary and sales manager; Chester Griswold, consulting engineer; Directors: Britton N. Bush, Howard Dickinson, William Swan, George A. Ellis, H. Walter Webb, Orlando Weber, A. B. Corder, Chester Griswold, E. A. Partridge, H. W. Johns.

INVENTORYING C. B. CO. STOCK

Columbus, O., May 24.—Receiver McLaren of the Columbus Buggy Co., of Columbus, has started to make a complete inventory of the assets of the concern, which were recently sold to the creditors' committee. The object of the inventory and statement is to show the creditors who have not entered into the agreement to purchase the assets the exact condition of the company's affairs. It is estimated that creditors which remains outside of the committee, will realize about 35 cents on the dollar, while the creditors purchasing the assets hope to secure two times that amount if the concern is operated. A plan is now being worked out to continue the business of the company after the reorganization.

To Make Cars on Coast

Seattle, Wash., May 23.—F. A. Mitchell is secretary of the new company which has just been incorporated to manufacture cars. Other officers in the company are F. J. Carvey of Seattle, president; A. J. Schram, vice-president of the California Motor Car Co., manufacturer of the Sunset car, who will be the designing engineer of the new car named the Schram; and W. R. McClelland, treasurer. The company is incorporated at Olympia with a capital of \$500,000. The Schram will be built in four and six-cylinder models.



TANK OF LIQUIFIED GAS BURNING AT OUTLET.

Targa Florio a Test of Driver and Car

How Nazzaro Won Sicilian Road-Racing Classic



START OF TARGA FLORIO

PALERMO, Sicily, May 14—Felix Nazzaro's success in the Targa Florio race was due to skilled driving and a reliable car. It was a race in which the man counted for much. Starting from Palermo, the competitors had to make a complete circle of the island of Sicily, the road keeping within sight of the Mediterranean practically the whole of the way.

Throughout the 650 miles there was not a straight stretch of more than a quarter of a mile in length, the greater portion of the route forming a ledge cut on the mountain side, with hairpin turns, and short steep gradients. The regulations allowed a cylinder area of 549 cubic inches, but owing to the nature of the road it was impossible to make use of all the power available from such dimensions and very few of the competing cars approached the limit.

Quick acceleration was an important factor, the weight problem had to be carefully studied, the cars required a wide steering lock and moderate wheelbase and the course was too dangerous for daredevil driving. No attempt was made to guard the roads; the competitors had to take their chance of meeting with mountain mules, which became scared at the sight of a motor car, and of Sicilian peas-

ants who were hardly less frightened.

Thirty-seven cars lined up for the start, which was given in the center of the town of Palermo at 5 a. m., the first car to get away being a Minerva with a Knight motor. The others followed at intervals of 10 minutes. Practically all the cars were standard touring models stripped for racing purposes. The equipment consisted of nothing more than a couple of seats, a gasoline tank, three to five spare wheels or tires, and a couple of headlights. These latter were necessary on account of the start of the second stage of the race being given to the leading car at midnight. Italians figured most prominently in the race. Among the foreigners were five American cars: an Overland, two Fords, a Metz and a Flanders. France had an eight-cylinder de Dion-Bouton and a 20-30 Renault; Belgium had one Minerva

with a Knight motor; Switzerland had a couple of Sigmas, also with Knight motors; and Germany was represented by a Mercedes team.

The first stage stopped at Girgenti, after a run of 447 miles. The real struggle on this stage was between Nazzaro, in his own car, and Marsaglia in the Aquila-Italiana, of which he is the designer. Marsaglia had started eighth, or nearly 2 hours before Nazzaro, and therefore was not aware how dangerous his competitor might be. This first stage proved a weeding out of the weaker cars and of the less skilled of the drivers, only sixteen of the competitors getting to Girgenti within the time allowance.

Marsaglia maintained his lead on the first day's run with an advantage of 30 minutes on Nazzaro. Bordino in a Lancia came in a very close third, there being an interval of more than an hour between this car and the fourth. Of the American competitors only the Overland was able to finish the first stage, Lopez bringing his car into tenth position sandwiched between a De Vecchi and an Isotta-Fraschini.

On their arrival at Girgenti the cars were locked up, the continuation of the

TABLE OF FINISHERS IN SICILY'S TARGA FLORIO

Car	No. Cyl.	Driver	Bore	Stroke	
Nazzaro	4	Nazzaro	3.93	5.51	19:28:40
Aquila-Italiana	6	Marsaglia	3.14	5.11	20:43:49
De Vecchi	4	Glorie			21:48:04
DeDion-Bouton	8	Berra	2.95	5.11	22:22:25
Fiat	4	Giordano	3.93	5.51	22:26:04
De Vecchi	4	Sivocci			22:47:00
Overland	4	Lopez	4.38	4.52	23:12:47
Lancia	4	Bordino	3.93	5.11	23:43:25
Isotta-Fraschini	4	Diana	4.33	6.29	23:46:00
Minerva-Knight	4	Stabile	3.93	5.51	23:59:04
Renault	4	Turner	3.93	6.29	24:30:00

POSITION AT END OF FIRST STAGE

Car	Driver	Car	Driver
Aquila-Italiana	Marsaglia	De Vecchi	Sivocci
Nazzaro	Nazzaro	Overland	Lopez
Lancia	Bordino	Isotta-Fraschini	Diana
Fiat	Giordano	Renault	Turner
De Vecchi	Glorie	Isotta-Fraschini	Conti
Minerva	Stabile	Fiat	DeRomse
DeDion-Bouton	Berra	Signa-Knight	DeProsperi
Itala	Negri	Mercedes	Inglese



NAZZARO, WINNER OF THE TARGA FLORIO

race being fixed for mid-night for the first car, Marsaglia's Aquila-Italiana, the others following with the same interval as marked their arrival. As the difference between the first and the sixteenth car was more than 6 hours, the actual starts were not a matter of great interest.

It naturally was dark when Marsaglia was given his start; Nazzaro also had to make use of his headlights, but had the advantage of having half an hour less darkness than his rival. At an early stage Marsaglia had trouble with his headlights, which gave Nazzaro a chance to creep up to him and finally get ahead. The two men chased one another over the mountain roads for a few hours, but finally Nazzaro's greater skill as a driver manifested itself, his car getting clear away from the Aquila-Italiana and finishing with an advantage of more than an hour. Bordinao, who had finished the first stage a good third, had trouble on the second day's run, causing him to fall back to eighth place. One of the rotary valve Italias dropped out, and the Overland crept up two places, finishing seventh. The cars which fell out on the second day's run were Itala, Isotta-Fraschini, Fiat, Sigma Knight and Mercedes.

Nazzaro's speed worked out at the average of 33½ miles an hour, which is considerably faster than any other competitor has made over this course. In 1907 Nazzaro won the Targa Florio for the Fiat, the race on that occasion being three rounds of the island. The winning car is a standard model built by Nazzaro at Turin, and having a four-cylinder monobloc motor of 3.9 by 5.5 inches bore and stroke. The motor is a fine, clean-cut casting with integral intake and exhaust manifolds, and having the body of the water pump cast with the crank chamber. The motor base and gearbox form a unit construction. The propeller shaft is carried in a torque tube and both sets of brakes are on the rear wheels.

The Aquila, with which its designer, Marsaglia, finished second, has a six-cylinder motor of 3.1 by 5.1 inches bore and stroke, the construction being distinctive by reason of the monobloc casting of cylinders and upper half of crank chamber. The valves are superimposed, but the overhead valves are hidden from view by an aluminum cover the full length of the group. The motor has integral intake and exhaust manifolds, with the carburetor bolted directly up to the top of the cylinder casting. Very big inspection plates on the right-hand side make it possible



FORD IN THE TARGA FLORIO

to take out a connecting rod and piston without dismounting the motor.

A. A. A. CONTEST RULINGS

New York, May 24—The last bulletin of the contest board of the American Automobile Association announces the reinstatement of the following racing drivers: Thera S. Duby, St. Louis; Ernest J. Delaney, Jackson, Mich.; R. H. Pennebaker, Memphis, Tenn. Applications for reinstatement of E. V. Rickenbacker, Des Moines, and C. V. Dunnivan, Memphis, were denied. Charles Shambaugh, Lafayette, Ind., entrant of a car in the Indianapolis race, was declared ineligible because of his having competed in an unsanctioned meet.

Claim for dirt track record made by Earl Cooper in a Stutz was allowed as follows: 200 miles, 3:27:23½, made at Fresno, Cal., February 10, 1913. Barney Oldfield's dirt track mile in :46½, made at Bakersfield, Cal., is held up until the board can approve the timing device.

BUICKS SHINE IN LE MANS TEST

Paris, May 14—Georges Boillot, piloting the racing Peugeot with which Goux set up world's records at Brooklands recently, was the star performer at the Le Mans Whitsuntide meeting. The 5 kilometers straightaway was covered in 1:56 2-5, being at the rate of 96 miles an hour. No other car came anywhere near the Peugeot's time. In the kilometer hill-climb, with a flying start, over an average gradient of 5 per cent, Boillot's time was :35 2-5, being at the rate of 62.8 miles an hour. America was represented in this meeting by two Buicks, one running as a racer, the other as a touring car. In the racing section the Buick was fastest in its class, putting up 2:58 2-5 for the 5

kilometers (3.1 miles) and :48 for the kilometer hill-climb. The touring Buick, driven by Repousseau, showed 3:26 for the 5 kilometers and 56 seconds for the kilometer hill-climb. The best time made in the touring sections, irrespective of size, was 2:36 less 1-5 for the 5 kilometers and :44 4-5 for the hill-climb. These times were made by a new model Rolland-Pilain, carrying six passengers. For the kilometer an Isotta-Fraschini tied with the Rolland-Pilain.

ATLANTA HILL-CLIMB

Atlanta, Ga., May 24—The Atlanta hill-climb, postponed from last Saturday, was run off today. It was, alas, but a shadow of its former self. In the old days big fields, fast cars and drivers of national

prominence—men like Burman, Strang, De Witt and others of their ilk—performed. This year the fields were small, the competition anything but keen and the interest not over hysterical.

L. S. Crane, in a Pope-Hartford, made the fastest time of the day, :50½, and put another leg on the Atlanta Automobile and Accessory Association cup. He also beat his record mark of last year, :51½, which stood as the mark of the hill over the new distance. It is considerably slower than the old one, made in earlier climbs, but the distance then was slightly shorter. By the ridiculous mistake of changing the distance of the climb only a few yards they gained nothing and threw all the old records, some of which were sensationally fast, into the discard.

The summary:

160 AND UNDER		
Car	Driver	Time
Studebaker	F. Lundgren	1:01½
Buick	C. E. Stewart	1:21½
Studebaker	Joe Brown	1:35

161-230 CLASS		
Studebaker	F. Lundgren	1:02½
Studebaker	Tom Hixon	1:07
Ford	J. L. Alexander	1:08½
Chalmers	Hugh Moss	1:11
Ford	W. T. Ward	*

231-300 CLASS		
Lion	J. B. Jones	1:04½
Pope-Hartford	L. S. Crane	1:18

301-450 CLASS		
Pope-Hartford	L. S. Crane	:50½
Case	J. B. Wade	1:04½

FREE FOR ALL		
Pope-Hartford	L. S. Crane	:51½
American	Jim Osborn	:58
Studebaker	F. Lundgren	1:01
Lion	J. B. Jones	1:03½
Studebaker	Tom Hixon	1:06½
Case	J. P. Wall	1:07

SIXTH EVENT		
Marion	Dr. Samuel Green	1:11½
Pope-Hartford	E. A. Holbrook	1:15½
Buick	Hugh Moss	1:27
Stoddard-Dayton	Joe Johnson	1:31½

SEVENTH EVENT		
Pope-Hartford	E. A. Holbrook	1:08
Apperson	Dr. Constantine	1:14
*Did not finish		

France Planning Sweeping Reforms in Road Construction

Credit of Nearly \$7,000,000 Set Aside for Upkeep

PARIS, May 14—Probably a credit of \$6,800,000 will be allowed this year for the upkeep of the 38,337 kilometers of national highway existing in France. This will represent an increase of \$400,000 compared with a year ago, and will be an allowance of \$243.6 per mile per annum for maintenance only. For 1914 it is proposed to grant the sum of \$7,200,000 for the national highways, this being at the rate of \$302.25 per mile per annum. These figures deal only with the national highways of France, which have a total length of 23,831 miles, and are entirely under the control of the central government. The three other classes of roads, which are more or less under local control, have a mileage of 339,867, giving a total for all classes of made roads in France of 363,698 miles.

Recent events have shown that the credit for the upkeep of French national highways is insufficient, not having kept pace with the increase of traffic and particularly motor traffic. Even the progressive increases made since 1910 are hardly sufficient to cover the increasing wear and tear. A proposal is now before parliament to make a special allowance of \$1,600,000 for the reconstruction of roads in most urgent need of repair. With a grant of this proportion and the projected increase for maintenance expenses the roads can be got back to their original perfect condition.

To meet the additional demands made on the highroads, the authorities are in favor of granite paving on a cement foundation. The granite blocks are small, have a smooth surface and are set very close, the result being a perfectly smooth highway on which motor cars can travel at the highest speeds without vibration. These roads are practically indestructible when used by rubber-shod vehicles, and offer a fairly good hold for horses. Their only disadvantages are that they are noisy when used by horses, and their cost of construction is \$12,400 per mile.

A considerable quantity of this kind of road has been laid in the neighborhood of Paris, where fast traffic is so intense that all other road dressings perish. Owing to cost it is not intended to apply this system except in special cases. A considerable use also is being made in the metropolitan district of tar macadam roads, the road material being prepared in special mixers and laid hot without the use of water as a binder. This is a system employed to a certain extent in America and very common in England. Obviously it differs radically from the tar-painted road.

The cost being higher than for an ordinary macadam road, it is proposed to include this system in the reconstruction scheme and obtain special grants for it.

Under this plan France obtains three distinct types of road dressing: granite blocks on cement foundation for intense traffic on national highways in the neighborhood of towns; tar macadam for heavy and fast traffic, and ordinary macadam for the main roads.

GEORGIANS HOLD A TEST

Savannah, Ga., May 26—Ten motor cars from Augusta rolled into Savannah Saturday afternoon. Rain Friday night more than cut the number of starters in half, twenty-four cars having been primed for the trip. The run was under the auspices of the Augusta Automobile Club. The only prize offered, however, was the governor's suite of rooms in the new Savannah hotel. Seven machines finished with perfect scores, so that the winner had to be decided by lot. D. M. Lyon and party won the throw off. His party is composed of himself, Mrs. Lyons, Miss Lyons and Miss Addison.

The Augustans were met a short distance from Savannah by Arthur W. Solomon, secretary of the Savannah Automobile Club, and J. A. Newcomb, of the Hotel Savannah. S. J. Newcomb, of Augusta, was in charge of the sociability run. His car set the pace for the others. The party started from Augusta at 7:30 o'clock in the morning and stopped near Savannah at 1:30 p. m. Half an hour was spent at Sylvania. The road from Augusta to Sylvania was in perfect condition. In Effingham county the roads were passable, but very rough. The trip was an enjoyable one. There were no casualties of consequence.

The visitors will remain in Savannah a day or two before returning at their own pleasure.

PEACE AT LAST IN OHIO

Columbus, O., May 26—Both of the warring factions in the Ohio State Automobile Association were brought together and all differences were buried at the annual meeting of the organization held at Columbus Saturday. The meeting was harmonious in every respect and was attended by representatives from seventeen motor clubs in the Buckeye state. In all thirty-seven delegates were present representing about 4,000 members of all of the clubs.

One of the most important actions was the adoption of a resolution instructing the new executive committee to take legal steps to have the new Warnes law declared unconstitutional. It is argued that the law which fixes the license fee to be charged for registration is really double taxation.

It was reported that the work of erecting danger and direction signs on the road leading from Cincinnati to Cleveland by

way of Dayton, Springfield and Columbus had been completed. The next work will be to erect signs on all eastern and western roads.

Officers were elected as follows: President, C. C. Janes, of Columbus; first vice-president, G. E. Mentell, Springfield; second vice-president, W. L. Faunce, Youngstown; third vice-president, W. L. Winning, Dayton; secretary, L. M. Browne, Columbus, and treasurer, J. H. Allen, Kenton. The president was empowered to name all standing committees.

NEW MOTOR BILL FOR DISTRICT

Washington, D. C., May 26—Special telegram—The annual registration of all motor vehicles, the payment of an annual license fee and the repeal of the wheel tax on motor cars are provided for in a bill "to regulate the licensing, registration and operating of motor vehicles in the District of Columbia" forwarded by the commissioners to Congress today with a request for its early enactment. The object of the bill is to vest in the commissioners complete authority to regulate motor traffic in the district.

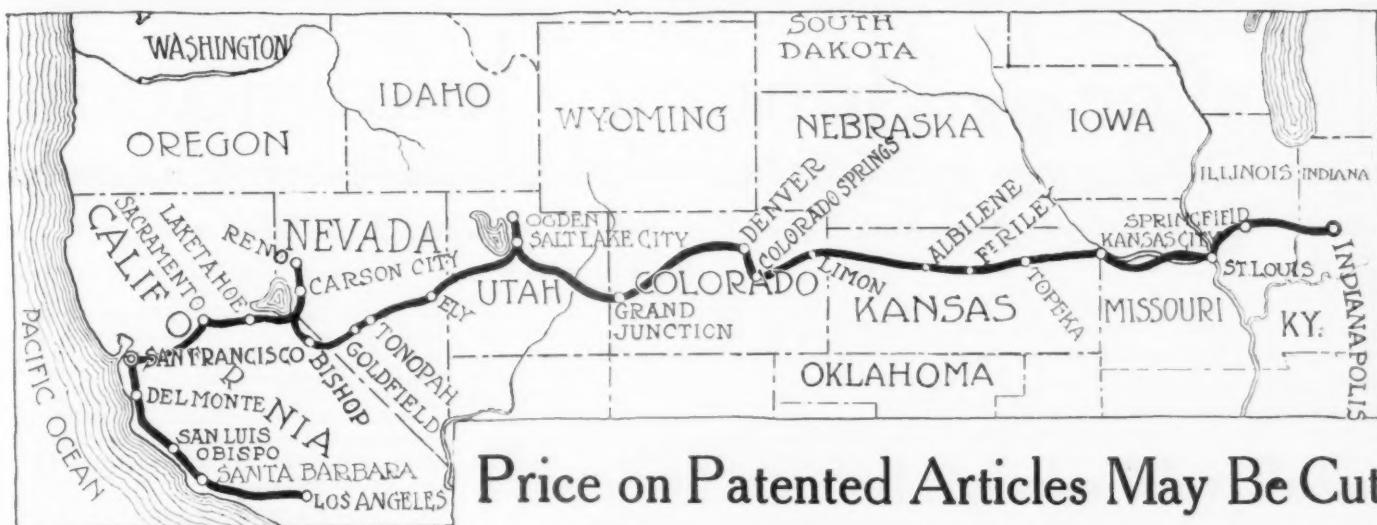
PROGRESS OF TRUCK BILL

Boston, Mass., May 26—Despite the opposition of prominent business men who use trucks, the motor dealers and others throughout the state the truck bill to tax motor vehicles \$5 a ton continues on its way. It came up last week in the senate where it was first reported by the committee on roads and bridges, and although an attempt was made to cut down the fee to \$3 a ton this was voted down and the republican steam roller got to work and passed it to be engrossed. One vote would have killed it, but Senator Montague came in and voted against it, although he represents in the senate the Boston district, where are located most of the motor houses. Next day reconsideration was moved, but it was lost on a tie vote and the bill was then passed to be engrossed and sent to the house. The bill took its several readings and it will come up this week for its final passage. It is expected that a fight will be made against it at that time. If it passes an appeal will be made to the governor to veto it, but not much is expected from that source.

TORONTO'S NEW MOTOR LAW

Toronto, Ont., May 24—The new motor vehicles act as amended at the session of the legislature, just closed, covers the following:

The issuance of a license to a driver for hire, pay or gain is made conditional upon the filing in the office of the provincial secretary of a certificate of character, physical fitness, ability to drive, and knowledge of the rules of the road. This certificate must be secured from two members of the Ontario Motor League resident in the driver's municipality, or, if



ROUTE OF INDIANA-PACIFIC TOUR

there are none, by two residents in the nearest municipality.

The rule of the road is amended so that a motor vehicle may now pass a standing street car on the pavement side as soon as the passengers have boarded or alighted safely, as the case may be.

Provision is made for appointment of special constables by the lieutenant-governor-in-council for enforcing of the act with a definition of their duties. Residents of other provinces who are not in Ontario for more than 3 consecutive months of the year are bound only by the laws of their respective provinces under which their vehicles must be registered and the number displayed.

Drivers are warned against making unnecessary noise with horns and bells and allowing emission of unreasonable amount of smoke. Fines for convictions also are determined, maximum being \$10 for first offense, \$20 for second, \$30 for third and \$50 for each succeeding offense.

FIRST CANADIAN HILL-CLIMB

Buffalo, N. Y., May 27—The first hill-climbing contest ever held in Canada, that of the Hamilton Automobile Club, on Dominion Day, last Saturday, resulted in victory for A. Sharp, of Toronto; time, 2:42. He drove a Wolseley. Other cars 35 horsepower and over scoring victories included Hudson, Stearns, McLaughlin, Overland and Russell.

MORE INDIANA-PACIFIC ENTRIES

Indianapolis, Ind., May 24—The Indiana Automobile Manufacturers' Association has received two Apperson entries for the Indiana-to-the-Pacific tour, which starts from Indianapolis on July 1. Elmer and Edgar Apperson will drive one of the Appersons.

YOSEMITE OPEN TO MOTORISTS

Yosemite, Cal., May 26—The first motor car to enter Yosemite National park since motor cars were excluded from the reservation several years ago has arrived here, driven by P. J. Walker, president of the San Francisco Automobile Club.

PROMOTION FOR G. W. BENNETT

Toledo, O., May 24—Announcement is made by John N. Willys of the appointment of George W. Bennett as general manager of Mr. Willys' interests in the Willys-Overland Co., Garford Co. and Gramm Motor Truck Co. Mr. Bennett also is vice-president of these three concerns.

Price on Patented Articles May Be Cut

U. S. Supreme Court Makes Important Decision

WASHINGTON, D. C., May 26—Special telegram—One of the most important patent decisions handed down by the United States supreme court in many years was rendered today in the case of the Bauer Chemical Co., and others, against James O'Donnell, a druggist of this city. While the case primarily relates to a proprietary medical preparation, it affects many patent owners, including those in the motor car court's decision, which was decided by a five to four vote.

The gist of the decision is as follows:

The real question is whether in the exclusive right secured by statute to "vend" a patented article there is included the right, by notice, to dictate the price at which subsequent sales of the article may be made. The patentee relies solely upon the notice quoted to control future price in the resale by a purchaser of an article said to be of great utility and highly desirable for general use. The appellee and the jobbers, from whom he purchased, were neither the agents nor the licensees of the patentee.

Upon such facts as are now presented we think the right to vend secured in the patent statute is not distinguishable from the right of vending given in the copyright act. In both instances it was the intention of congress to secure an exclusive right to sell, and there is no grant of privilege to keep up prices and prevent competition by notices restricting the price at which the article may be resold.

The right to vend conferred by the patent law has been exercised, and the added restriction is beyond the protection and purpose of the act. This being so, the case is brought within that line of cases in which this court from the beginning has held that a patentee who has parted with a patented machine by passing title to a purchaser has placed the article beyond the limits of the monopoly secured by the patent act.

DRAWBACKS ALLOWED

Washington, D. C., May 25—The customs division of the treasury department has been busy during the past week issuing drawback regulations to motor car companies.

One prescribes that drawback of duties shall be allowed under section 25 of the tariff act of August 5, 1909, on motor cars designated as model T, manufactured by the Ford Motor Co., of Detroit, with the use of imported aluminum and Scandinavian brake lining. The drawback allowance is not to exceed the quantities of imported material appearing in the exported cars, as shown by the maker's sworn statement, filed with the collector of customs at Detroit.

A similar regulation has been issued allowing drawbacks to the Abbott Motor Car Co., of Detroit, on motor cars and motor car rear axles manufactured by that company with the use of imported ball bearings. The regulations stipulate that the allowance shall not exceed the number of imported ball bearings appearing in the exported cars or axles as shown by the manufacturers' sworn statement, also filed with the collector of customs at Detroit.

Drawback allowances will also be given the Stegeman Motor Car Co., of Milwaukee, on exportations of motor trucks manufactured by that company with the use of imported magnets and ball bearings.

The American Ever Ready Co. is to receive drawback allowances on exportations of Ever Ready ignition batteries.

CHICAGO GARAGE PLAN REJECTED

Chicago, May 26—At the meeting of the south park board held last week, the commissioners rejected the plans for the proposed subway garage under Grant park on the ground that such a structure was not feasible. What action Mayor Harrison, sponsor for the underground garage, will take now is not known, although it is reported that he will request a reconsideration. Unless the park commissioners adopt the plan, it will have to be abandoned as they alone have jurisdiction over Grant park which is the property of the state and not of the municipality.

BAY STATE SPEED BILL STOPPED

Boston, Mass., May 26—The 25-mile-an-hour speed law for Massachusetts met a thank-you-ma'am in the senate unexpectedly on Thursday and it failed to pass that body. However, as reconsideration was moved the bill may be taken up next week again.

MOTIONS DENIED IN HARTFORD SUIT

New York, May 26—The motion of the Hartford Suspension Co., in the United States district court, southern district of New York, praying for an injunction against the Concrete Bumper Co., has been denied by Justice Lacombe, as was the motion of the defendant to dismiss the bill of complaint. The latter refers to the making of bumpers, the bars of which are filled with concrete. The answers will be filed in the near future.

WRONG HORSEPOWER GIVEN

A typographical error in Motor Age last week, page 16, made it appear as if the Packard motor, in its 300-hour test, averaged only 31 horsepower, whereas the official report, published on page 13, shows it to have been 35.7.

Routes and Touring Information

Condition of New York Roads Reported by Highway Superintendents

COUNTY highway superintendents of New York, at the request of Motor Age, have furnished the following reports on roads in their respective districts in order that road service bulletin for the use of transcontinental tourists may be started. It is the object of this bulletin to give road condition information by counties on the transcontinental highways, first taking up the central route, second the National or Old Trails highway, and, third, the southern route. Where roads are being repaired the necessary detours will be given, and the improvement contemplated for this season will be outlined.

Pennsylvania, Ohio, Indiana, Illinois, etc., will be taken up in order across the country, and clubs or individuals desiring to give their assistance to Motor Age in furthering transcontinental touring can send in road condition information and it will be gladly published. It will be noticed that there are a few counties on which Motor Age has been unable to secure information, but this will be forthcoming later.

DUTCHESS COUNTY

Poughkeepsie, N. Y.—Road conditions are in far better shape than last year at the same date. All state and county roads are with but very few exceptions in good condition; a few spots are rutted and not frequently a rough place where the action of the frost seemed to have disintegrated the bituminous binder. Only one detour in the county, between Wingdale and Pawling, which is not the road used by transcontinental tourists; it is well posted and the road over which the detour is laid is in excellent condition. All town roads have been gone over with primary work, loose stone has been removed and a general good condition of town roads is in evidence today. Motorists can go anywhere on the roads of this county with safety and comfort. Improvements contemplated in state and county road work are yet not outlined officially by the state superintendent of highways; no doubt a few roads will be let this year, but no definite information is available at the present writing. On town road work improvements such as widening roads, taking out rock, cutting down grades and resurfacing with crushed stone and gravel will be done more extensively than in previous years; on concrete bridge work much activity will be shown; this county each year builds from fifteen to twenty-five concrete bridges, and a larger number of sluices.—A. C. Rapelje.

SCHENECTADY COUNTY

Schenectady, N. Y.—All roads in the county are open. The Schenectady-Amsterdam road via Scotia road, however, is still under contract, but open and in fine condition. The Quaker St.-Central bridge road is under construction and is rough but passable. Schenectady to Central bridge the road via Esperance should be used. The macadam road from Schenectady to

Amsterdam via Mariaville is in fair condition. On the Schenectady-Saratoga road the dirt road to Burnt Hills is in good condition, although slightly sandy. The macadam is good on to Saratoga. The Schenectady-Albany macadam is in a badly rutted condition. Schenectady to Troy is macadam in fair condition but rough in several places. The Schenectady-Altamont road is macadam and dirt in fair condition, and on the road leading to Esperance the macadam is good but the dirt road poor to fair, very stony but safe. Town roads all through the county are passable, some being very good and some rather rough, but the town forces are very active at this time, as the weather and soil conditions are favorable for road work.—H. W. Cregier.

HERKIMER COUNTY

Herkimer, N. Y.—The main traveled route across the county going through Herkimer is traversed the entire distance by a state macadam road in good condition. There are at present no detours. Cross the overhead crossing over the New York Central tracks at Utica, follow the trolley track to the end and keep straight ahead to Herkimer. At Herkimer take the left-hand fork after passing the cemetery, follow the street to court house, turn right to railroad track, turn left and keep straight ahead to Little Falls, follow left-hand trolley track in Little Falls to the Y keeping straight ahead to St. Johnsville where policemen are active.—W. H. Corey.

MADISON COUNTY

Wampsville, N. Y.—The main traveled roads are in very good condition and the construction which is now being done is on roads that have never been used as motor routes to any great extent. There is to be constructed a state road from Cazenovia through Morrisville, and Bouckville to the eastern line of Madison. This road is a portion of the Cherry Valley turnpike and will when completed open one of the most pleasing and historical sections to the motor public. I hardly could advise as to a detour to be taken in avoiding the construction work on this road as it extends nearly the entire width of the county and the roads that are somewhat parallel to it are all of about the same general condition. There is only one other road under construction in this county and that is known as the Oneida lake road and the section that is closed for work is from Lakeport to the east line of Sullivan, a distance of about 3 miles. There is no detour marked out for this road, as it is not a main through route. Through travel east and west should follow the Syracuse and Utica line if possible in avoiding both of the road constructions above mentioned.—G. S. Tibbits.

ONONDAGA COUNTY

Syracuse, N. Y.—The spring's primary work has been completed and the main lines are in fairly good condition. At Camillus, 8 miles west of Syracuse, there is a closure, and a detour route has been established to the north of Genesee turnpike. This route is well marked by detour signs furnished and set up by the county highway department. The other sections of the main east and west route through the county are clear and in good condition. The state route to

the northwest is under contract between Syracuse and the county line, and not in good condition for traffic, although no closures have been established. Passage over this route should be made by the way of the state fair grounds and Baldwinsville to Phoenix. The road through Cardiff valley to the south of Courtland from Syracuse is in fair condition as is also the route to the north by the way of Cicero and Brewerton.—F. E. Bogardus.

CAYUGA COUNTY

Auburn, N. Y.—The New York state line crossing Cayuga county will be obstructed at the western end by construction until July 1. Detour is by ferry at Cayuga village or keeping further to the north of the end of the lake, entering the county at Montezuma or Spring Lake. Detour via Spring Lake is over good gravel and earth roads, crossing back over the Seneca river at Mosquito Point, the trunk line from Auburn to the east being completed. The through route from Rochester to Oswego through Fair Haven and Sterling is an all macadam road across the county. Auburn to Ithaca is under construction, several parallel roads of earth and gravel excellent except in rainy weather being available. The best detour is Auburn to Fleming hill over the state road to Scipio Center, to Merrifield, Scipioville, Poplar Ridge, King Ferry and Lake Ridge. The road down the west side of Owasco lake is under construction, and will probably be finished in July. Except in wet weather 80 percent of all Cayuga county roads are good for motorists, but an earth road when wet will slip.—J. C. Dayton.

SENECA COUNTY

Waterloo, N. Y.—The center road running north from the village of Ovid for a distance of 10 miles is under construction and closed to traffic. The detour should be made to parallel roads 2 miles west or 1 mile east. The earth roads are all in fair condition. Four miles of the road east of Geneva is under contract, and tourists should follow the trolley line after leaving Geneva going east. About 7 miles of macadam road was built last year, and about \$80,000 will be spent this year to complete roads now in course of construction.—J. H. Yound.

WAYNE COUNTY

Lyons, N. Y.—The two main roads across the county east and west will undoubtedly have portions closed during the season. On the northern route the road is closed from Ontario Center to Williamson. The detour from Ontario Center is north to the first right hand turn, east to Pultneyville and Williamson road, and then right to Williamson. This route will be open from there to Walcott, where it is closed to Red Creek, the detour being north to Sherwood's corners, and east to Red Creek. These detours are fair country roads. The road across the southern portion of the county is now open the whole length. There is a probability that the road from Lyons to Clyde will be closed, and if so the detour will be north to Pilgrimage, Ferguson's corners, to the Rose-Clyde road following it into Clyde. This road is only in fair condition.—W. G. Sisson.

ONTARIO COUNTY

Canandaigua, N. Y.—No main roads across the county are closed, and all the roads

in the county are good. Only about 6 miles in the town of Gorham, which is not on the main traveled route, will be improved this season.

MONROE COUNTY

Rochester, N. Y.—All Monroe county roads are usable without discomfort. The roads which are closed for construction this year are all local pieces, and in each case, the detour is handy and in good shape. The roads closed are as follows: Walker-Lake Ontario road in Hamlin, the southerly 2 miles in that town; Buffalo road just west of Churchville is broken by new bridge being constructed over the New York Central Rail-

road, but the detour is very plainly marked; the Fairport Nine-Mile Point road in Webster is under construction and is avoided by taking the parallel roads on the east or west side within a mile; the east side boulevard in Irondequoit is under construction at the north end a little over a mile, but there is a detour very close to it.—J. Y. McClintock.

CHAUTAUQUA COUNTY

Fredonia, N. Y.—The main roads in the county are all open for traffic and in good condition. The highway on the east side of Chautauqua lake is under contract for improvement and work will soon begin, and

the detour for same will be the road on the west side of the lake for through traffic from Mayville to Jamestown. About \$300,000 will be spent on improved roads this season, and about \$100,000 on improving earth roads, good detours being provided in every case.—W. D. Leet.

ERIE COUNTY

Buffalo, N. Y.—From Rochester to Batavia, Buffalo, Silver Creek, Fredonia, Brocton, Westfield to Erie the central transcontinental route is entirely open with the exception of a short stretch through Lackawanna City which is undergoing improvement.—Automobile Club of Buffalo.

Answers to Route Inquiries from Motor Age Readers

Farmington, Ill.—Des Moines, Ia.

FARMINGTON, ILL.—Editor Motor Age—Please give me the best route to Des Moines, Ia.—Butler & Son.

A trip of 251 miles to Des Moines is that entering Iowa at Burlington by routing first through Maquon, Knoxville, Galesburg, Monmouth, Oquawka, and the ferry across the river. The bottom road in the Iowa side is liable to be bad in wet weather. Going over the first section of the Blue Grass road to Ottumwa, through Middletown, New London, Mt. Pleasant, Rome, Fairfield, and Batavia you will have excellent roads over slightly rolling country. This is 78 miles, then the White Pole road to Des Moines, 92 miles, which is natural dirt road and will be bad in wet weather passing through Fremont, Oskaloosa, Monroe, and Prairie City.

A Blue Book 5 will give the running directions from Galesburg, and you probably know how to reach that city.

Route to Imperial Valley

San Diego, Cal.—Editor Motor Age—Kindly let me know the best route to the Imperial valley.—Reader.

San Diego to El Centro is 124 miles routing through Spring Valley, Oakdale, Dulzura, Potrero, El Campo, Devil's canyon, where there are very steep grades with sharp turns then into El Centro. Going through the Imperial valley to Yuma is 102 miles the towns being Imperial, Brawley, Mammoth, Glamis, Drylyn and Ogilby. You will have to ferry over the Colorado river to Yuma, the charges being \$2.

Colorado Road Conditions

Savanna, Ill.—Editor Motor Age—I would like to know something about the probable conditions of the road to Denver and Colorado Springs. We would strike the transcontinental highway at Clinton, 20 miles south of here, or the River-to-River road at Davenport, 60 miles south. Which route is advisable, say starting about June 7? Would one need the Blue Book for running directions, and if so, is the 1913 edition out?—F. S. Greenleaf.

One road is equally as good as the other crossing Iowa. They are both natural dirt, dragged after rains, both have a few sandy places and also are a trifle rolling. As you are only 20 miles from Clinton, you might follow the Iowa transcontinental to Cedar Rapids, through De Witt, Clarence, Mechanicsville, Liston, Marion, and route through Fairfax, Amana to Marengo on the River-to-River road then through Ladora, Grinnell, Newton, Colfax, Des Moines, Adell, the White Pole road through Earlham, Stuart, Adair, and Anita to Atlantic, then the River road again through Marne, Avoca, Minden, Underwood to Council Bluffs and Omaha.

Marked with orange and black stripes the Platte Valley route across Nebraska leads over a road kept up by dragging. It runs through Columbus, Grand Island, Kearney, North Platte, to Julesburg, Colo., then into

Denver through Sedgwick, Proctor, Sterling, Ft. Morgan and Bennet. An excellent gravel road barring the first 13 miles out of Denver, leads to Colorado Springs through Sedalia, Palmer Lake, Monument and Breed, and many fine views of the mountains can be had while on this last stretch, particularly about 10 miles north of Colorado Springs.

The 1913 edition of volume 4 and 5 Blue Books are now out. You will only need volume 5, however, for this trip. There are motorists who do take trips without running directions, but it is worth the \$2.50 to be able to take up such a book when in doubt and consult it rather than someone along the roadside who nine times out of ten gives you the wrong direction.

In making your return trip we might suggest that you come south to Pueblo and follow the Santa Fe trail across Kansas passing through La Junta, Syracuse, Dodge City, Great Bend, Hutchinson, Newton and Emporia to Kansas City, thence to St. Joseph, Mo., Mt. Airy, Ia., Des Moines, Newton, Grinnell, Marengo, Iowa City, Davenport and Clinton.

Columbus, O.—Kenosha, Wis.

Washington C. H., O.—Editor Motor Age—We would like to have a direct route from Columbus or Dayton, O., to Kenosha, Wis.—M. & J.

At the present time, the best road is through Xenia to Dayton, Eaton and Richmond, thence into Indianapolis over the National highway through Greenfield and Cumberland. The itinerary between Indianapolis and Chicago was given in the issue of last week and you can follow it in a reverse direction through Crawfordsville, Lafayette, etc. It is a very pretty run north from Chicago through Evanston, Wilmette, Highland Park, Lake Forest, Waukegon, Zion City and Winthrop Harbor to Kenosha. A road over which faster time can be made but through uninteresting country will be found via Wilmette, Glenview, Deerfield, Everett, and Kenosha.

Blue Book 4 can be used for running directions.

Newell, Ia.—St. Joseph, Mo.

Newell, Ia.—Editor Motor Age—Kindly furnish me with a motor car route to St. Joseph, Mo., via Maryville, Mo. I am planning on going between the first and middle of June.—S. A. B.

Route to Fort Dodge through Fonda, Pomeroy, Manson and Barnum, then 92 miles to Des Moines, passing through Dayton, Pilot Mound, Ogden, crossing the river to Boone, and going on to Madrid, Polk City, and Sallor. You will find it 161 miles to St. Joseph by way of Marysville, over a natural dirt road through Waukeg, Adell, Dexter, Stuart, Menlo, Greenfield, Creston, Lenox, Sharpsburg, Bedford, Hopkins, Marysville, Barnard, Bolckow, Rosendale, and St. Joseph.

This route is outlined in Blue Book 5.

Madison, Wis.—St. Louis, Mo.

Madison, Wis.—Editor Motor Age—I am going to start on a trip about the first week in June and would like a routing to St. Louis, Mo., then to Columbus, O., Chicago, and return.—W. J. Teckemeyer.

Between Madison and St. Louis the distance is 412 miles, divided as follows: Madison to Dixon, Ill., 118 miles through McFarland, Stoughton, Edgerton, Janesville, Beloit, Rockford, Byron; Dixon to Springfield, 177 miles through Princeton, Bureau, Putnam, Henry, Chillicothe, Mossville, Peoria, Groveland, Delavan, Middletown; Springfield to St. Louis, 117 miles over the Alton Way through Chatham, Thayer, Girard, Nilwood, Carlinville, Chesterfield, Challa-combe, Brighton, Godfrey, Alton, Oldenburg, Nameoki, Granite City and Venice.

In dry weather you will find the direct road to Terre Haute all right, otherwise it is best to take the Alton Way back to Springfield, then through Decatur to Terre Haute. The National road is through Collinsville, Highland, Pocahontas, Greenville, Mulberry, Vandalia, Effingham, Teutopolis, Martinsville and Marshall, a distance of 173 miles. You will reach Indianapolis with 70 miles travel through Brazil, Harmony, Reelsville, Coatsville, Stilesville, and Plainfield, and Columbus with 180 miles travel through Greenfield, Knightstown, Cambridge City, Richmond, Eaton, Dayton, Xenia, Springfield, Vienna, Lafayette, and Jefferson.

Good gravel or macadam roads extend to South Bend, taking in Dublin, Marysville, Zanesville, Bellefontaine, Roundhead, Lima, Delphos, Van Wert, Ft. Wayne, 153 miles. Ft. Wayne to Chicago is 179 miles, passing through Churubusco, Wolf Lake, Ligonier, Goshen, Mishawaka, South Bend, New Carlisle, La Porte, Westville, Valparaiso, Deep River, Merrillville, Schererville, Highlands, Hessville, Grassell, Whiting and Chicago.

Going back to Madison take the road by way of Elgin and Algonquin, being 82 miles over gravel or stone roads through Garfield and Oak parks, Maywood, Addison, Ontarioville, Elgin, Algonquin, Crystal Lake, Ridgefield, Hebron, to Lake Geneva, and 73 miles through Delavan, Janesville, Edgerton, Stoughton and Lake Waubesa.

A Blue Book 4 can be used for running directions.

El Paso, Tex.—Colorado Springs

El Paso, Tex.—Editor Motor Age—Kindly give me the best route to Colorado Springs and Denver and return. Where can I obtain the Blue Book covering these routes? Is it possible to go by way of Las Vegas and Ratoon, N. M.?—W. M. P.

Leaving your home town and headed for Alamogordo, a distance of 14.5 miles, you pass through Canutillo, Anthony, Berino, Mesilla Park, Las Cruces and Alamogordo. Roswell is 124.4 miles away and to reach it you go through La Luz, Glenco, Hondo,

Latest Styles in Women's Motor Coats



TO the woman who motors to the 500-mile race, the coat and hat shown in the upper illustration are recommended. The coat is a straight line garment of black and white check Manchester wool with adjustable collar, deep buttoned cuff and a double-belt holding the fullness in the back. The coat fastens with black bone buttons and is lined with gray silk. The hat is a brown hemp braid turban trimmed with pheasant's quills and draped with a blue veil. Both coat and hat are from Carson, Pirie, Scott & Co., Chicago.

Another coat that is exceptionally utilitarian and very smart is one shown by Mandel Bros., Chicago. It is made of a soft Scotch tweed mixture and bound with brown broadcloth. The coat has a loose peasant sleeve, but no pockets. It fastens with tortoise shell buttons and has a brown satin lining. The hat shown in the illustration is a close-fitting model of green hemp straw. It is trimmed with spark blue ribbon and ornamented in front with a French bouquet of roses.

Tinnie, Picache, to Roswell. With Santa Fe your next objective point, 194.6 miles, go through Vaughn, Encino, Lamy into Santa Fe. Undoubtedly you will want to spend some time in Santa Fe. Here is located the oldest house in the United States, being built in 1530. Here also is the old cathedral and the Spanish Governors' palace.

From Santa Fe to Trinidad, 216.2 miles, the intermediate points are: Canoncito, Glorieta, Rowe, Pajarita, Bernal, Tecolote, Las Vegas, Dog Canyon, Wagon Mound, French, Maxwell, Raton, Welcome Arch, Morley, Trinidad.

It is a day's trip to Colorado Springs, 132.7 miles. Leaving Trinidad, your route is through Aguilar, Rouse, Walsenburg,

Pueblo, Buttes Station, Fountain, Kilker Station, Colorado Springs.

On the return trip, retrace your route as far as Pueblo, then we suggest that you go to La Junta, 65 miles, through Orchard Park, Manzanola, Rocky Ford, Swink, La Junta. Continue through Las Animas, Prowers, and Lamar. At this point we would suggest that you "cut across lots," as it were, going to Texhoma, which is on the state line between Texas and Oklahoma. From Texhoma go west to Stratford and continue for 88 miles through Dumas to Amarillo.

Going south from Amarillo to Plainview, Tex., 83 miles, you will go through Canyon City, Nina, Happy, and Tulla. From Plain-

view go to Hale Center, thence south to Abernathy, and Lubbock, thence west and southwest to Brownfield, 120.3 miles. Leaving Brownfield your route will be via Gomez, Glen Park, Plains, Broncho, Four Lakes Ranch to Roswell, 148 miles.

You now have 238 miles to cover, and from Roswell retrace the route over which you travelled on the going trip. It would be the part of wisdom to secure a copy of the 1913, volume 5, Blue Book for complete running directions.

Wyndmere, N. D.-Missoula, Mont.

Wyndmere, N. D.—Editor Motor Age—We are going to take a trip in about 2 weeks to Missoula, Mont., and I should like to know the best route and general condition of the road, and also what equipment to take along.—Wyndmere Auto and Machine Co.

Go to Jamestown, either through Moulango and Edgeley or through Valley City. Bismarck will be reached with 107 miles' travel, passing through Woods, Mapleton, Casselton, Wheatland, Buffalo, Tower City, Valley City, Hobart, Sanborn, Urbana, Spiritwood, Jamestown, Medina, Crystal Springs, Tappan, Steele, McKenzie and Burleigh. You will have to continue to Missoula without running directions, passing through Dickinson, Medora, Sentinel Butte, Beach, Glendive, Fallom, Terry, Miles City, Forsyth, Custer, Huntley, Billings, and Livingston from which city the Yellowstone Park can be visited by going a short distance through Gardiner, but the same road will have to be traversed to get back to Livingston to route on to Bozeman, Three Forks, Whitehall, Butte, Anaconda, Garri-son and Drummond.

Besides the necessary extra inner casings and complete tool box, you should have a shovel, manilla or steel rope, folding canvas bucket, desert water bag kept filled with drinking water, extra can filled with gasoline, also something to stave off hunger, for instance a box of crackers and some canned goods—sardines, salmon or some such articles.

The roads are bad after heavy rains and are the best to be found in that territory. This road is expected to receive a lot of Yellowstone travel this summer.

Aurora, Ill.-Cadiz, O.

Hinckley, Ill.—Editor Motor Age—Please give me the best route from Aurora, Ill., to Cadiz, O., and return.—J. A. Nash.

Go to South Bend, 150 miles through St. Charles, Geneva, Aurora, Plainfield, Joliet, Gaugers, Frankfort, Dyer, Schererville, Merrillville, Deep River, Valparaiso, Westville, La Porte and New Carlisle over a road that is usually good.

A good gravel road will take you to Lima through Mishawaka, Osceola, Goshen, Ligonier, Wolf Lake, Churubusco, Fort Wayne, Van Wert, Delphos and Elida.

With 145 miles between Lima and Massillon your road lies through Ada, Forest, Upper Sandusky, Bucyrus, Gallon, Mansfield, there being quite hilly country on to Mifflin, Hayesville, Reedsburg to Wooster then Massillon is reached by way of Dalton and Brookfield. Navarre, Beach City, Canal Dover, New Philadelphia, Tuscarawas, Dennison and Tappan will find you in Cadiz.

For a return trip the country to Coshoc-ton is a little wild passing through Tuscarawas, Gnadenhutten, New Comerstown, and West Lafayette where you turn south to Zanesville through Conesville, Adams Mills, and the towpath along the canal to Dresden. Taking the National highway to Indianapolis the routing is outlined in the issue of last week for speedway tourists, and the instructions for Chicago-Indianapolis motorists can be followed in a reverse di-



rection to Merrillville, then heading west to Aurora. You can use Blue Book 4 for your directions.

Lewiston, Mont.-Medford, Ore.

Lewiston, Mont.—Editor Motor Age—Kindly give me the best route to Boise City, Idaho and Medford, Ore., also from Boise City to Spokane.—C. S. Weaver.

Your best road will be found running through Big Timber, Livingston, Bozeman, along the western end of Yellowstone to Yellowstone station, and on to St. Anthony, Idaho Falls, Black Foot, Pocatello, American Falls, Twin Falls, Shoshone Falls, Bliss, Mountain Home and Boise City. Continuing into Oregon a road will take you through Caldwell, Vale, Burns,

Prineville and Bend to Medford. Use a great deal of care and have such supplies as are suggested to Wyndmere, N. D.

To reach Spokane leave Caldwell, Idaho for Weiser, then into Oregon by way of Baker City, Union and Walla Walla using the greatest amount of caution on to Wal-lula and in the Columbia river territory. Going through Prosser, Wash., North Yakima, Cle Elum, Brewett Pass, Wenatchee, Waterville, Coulee, Almira and Davenport, you will arrive in Spokane.

In traveling through sparsely populated country the roads will not be of the best, as you can judge from jaunts which you no doubt have taken into the country from Lewiston. However, the route we have out-

lined for you will present the best conditions. There are no books giving directions for these roads to our knowledge.

St. Paul, Minn., to Chicago.

St. Paul, Minn.—Editor Motor Age—We are planning a trip to Chicago this summer and would like to have Motor Age give us the best route, and also the kind of roads we will have to contend with.—Marian W. Oakes.

Leaving St. Paul your route will be eastward toward Eau Claire, crossing the St. Croix river by ferry at Lakeland and passing through Hammond, Wilson and Menominee over very good natural roads most of the way. Continuing east from Eau Claire you will follow a well-traveled road through Chippewa Falls, Anson, Cadott, Stanley, Withee to Abbotsford, where you should turn south through Colby, Unity to Spokeville, then bearing southeast through Mannville, Marshfield, Auburndale and Milladore to Stevens Point. Thence by the same general direction you should reach Amherst, Waupaca, Weyauwega, Fremont, Dale and Oshkosh. Going south from Oshkosh, skirting the western shore of Lake Winnebago a good gravel road all the way carries you to Fond du Lac. With Milwaukee the next objective point good travel road will be found via Theresa, St. Lawrence, and Menominee Falls. Leaving Milwaukee by Kinnikinnick and Howell avenues the towns on the last section of the trip are Franksville, Corliss, Truesdale, Everett, Deerfield, Glenview, Wilmette and Evanston. A Blue Book 4 can be used for the trip if running directions are desired.

Tulsa, Okla.-Kansas City, Mo.

Tulsa, Okla.—Editor Motor Age—Please give me the best route from Tulsa to Kansas City by way of Joplin, Mo.—R. G. B.

Your road north through Oklahoma lies through Collinsville, Oologah, Talala and Nowata to Coffeyville, Kans., where you turn east through Valeda, Edna, Chetopa and Galena to Joplin. It is 181 miles to Kansas City from Joplin, passing through Carthage, Boston, Lamar, Nevada, Rich Hill, Butler, Adrian, Archie, Harrisonville, and Peculiar. Another road to Kansas City through Kansas lies from Coffeyville to Cherryvale, thence 183 miles through Chanute, Humboldt, Colony, Garnett, Richmond, Ottawa, Edgerton, Olathe, and Martin City.

Mobile, Ala.-New York

Mobile, Ala.—Editor Motor Age—I am thinking of taking a trip to New York and would like a route suggested.—W. Van Antwerp.

You can drive to Montgomery by traveling first to Jackson, 74 miles, through Axis, Mt. Vernon, Calvert, Oak Grove, Leroy, and the Tombigbee river ferry to Jackson. Jackson to Selma is 108 miles, and the towns Grove Hill, Thomasville, Pine Hill, Catherine, Gastonburg, Orville and a good road will find you in Montgomery.

For the balance of the trip you are referred to the issue of February 27, page 25.

Wilmington, O.-Lexington, Ky.

Wilmington, O.—Editor Motor Age—Please publish the best route to Lexington, Ky., via Maysville, Ky.—M. L. Bonta.

You will have excellent scenery for your 180-mile trip to Lexington. To Cincinnati you pass through Clarksville, Morrow, Montgomery, Pleasant Ridge and Norwood, routing to Maysville on the Kentucky side of the Ohio river through Newport, Cold Springs, Alexandria, Grants Lick, Caddo, Berlin, Brooksville, Fernleaf, Maysville, and good stone pike 63 miles to Lexington, through Mayslick, Blue Lick Springs, Millersburg, and Paris. A Blue Book 4 may be used for running directions, etc.

New Ideas in Tweed for Men Drivers



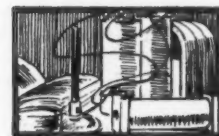
A COPY of a popular English coat for motoring is shown at the left of the upper illustration. It is made of Scotch tweed and loose enough to be comfortable but not extreme. It has a lapel collar, belted back and large patch pockets. This model is from Marshall Field & Co., Chicago. The other coat, shown at the right, is from The Hub, Chicago. Made of Irish Donegal homespun, it is good style for city wear as well as for extensive touring, as it has a convertible collar. Slash pockets and belted back are other features.

A very distinctive coat of Burberry tweed is shown in the small illustration. It is one of Capper & Capper's 1913 English importations and very popular with Chicago motorists. It is a modified wheel coat with a full sweep to the skirt and cut quite extreme. The coat has an inverted pleat in the back and the fullness is held in with a wide belt. The collar is convertible and the pockets are patch pockets.





The Readers' Clearing House



MITCHELL MADE 6,000 CARS IN 1912

Disk Clutch Is More in Evidence Than the Cone Type—Speed of Mitchell

NICKERSON, Kan.—Editor Motor Age—What type of clutch is used more, the cone or multiple type?

2—What is the gear ratio and horsepower of the Avery 5-ton truck?

3—What is the speed of the Mitchell 40 and how many miles can it make on 1 gallon of gasoline?

4—How many cars did the Mitchell company build in 1912?—Subscriber.

1—Manufacturers are building more cars with disk clutches than with the cone type. There are 173 makes with the former and 149 with the latter.

2—The gear ratio of the Avery 5-ton truck is 9.83 to 1. At 1,500 revolutions per minute, the motor is said to give 60 horsepower. The S. A. E. rating is 36.1 horsepower.

3—The six-cylinder Mitchell, known as model 5-6, has been driven at the rate of 72 miles per hour. In a factory test the car traveled 12 miles on 1 gallon of gasoline.

4—According to the Chicago agent, the Mitchell company turned out about 6,000 cars in 1912.

SOME DETAILS OF KEETON RACER

Car Which Burman Will Drive on the 30th Is of 105 Horsepower

Janesville, Wis.—Editor Motor Age—Is Bob Burman's Keeton racer of 100 horsepower, the stock car called the 6-48, or is it a special?

2—Is Bob Burman racing for the Keeton company or for himself?

3—On the stock car the fourth speed is geared up. Will Burman use this, or direct drive?

4—What is the maximum speed of this car?

5—Are the valve tubes on the new Speedwell rotary motor solid or hollow?—E. H. Amelphal.

1—A block test has shown the Keeton motor which is installed in Burman's racer to give 105 horsepower.

2—Bob Burman will drive for the Keeton company, but arrangements have been made whereby Burman is to receive all that he wins.

3—According to the Chicago agent, Burman will use direct drive.

4—In a recent test the car was driven at the rate of 103 miles per hour.

5—Solid.

COMMENTS ON GARAGE FAILURES

Discourtesy a Cause—Owner Should Use Tactics of a Banker

Jefferson, Ia.—Editor Motor Age—One of your correspondents has pointed out one of the reasons why there is so large a percentage of failures in the garage business. The fact that a highly skilled and highly paid mechanic is so often taken away from his regular work and put to blowing up tires or putting water in a radiator is in-

Questions Answered and Communications

Subscriber.....Nickerson, Kan.
J. Alexander Meldau, Newberry, S. C.
William A. Hourigan, Rochepot, Mo.
E. H. Amelphal...Janesville, Wis.
J. H. Jones.....Grinnell, Ia.
Frank Lee.....Springfield, Mo.
C. D. Enfield.....Jefferson, Ia.
J. H. Cole.....Brandon, Vt.
Syvester Sparling.....Chicago.
R. E. B.....St. Louis, Mo.
A Subscriber.....Detroit, Mich.

dicative of the lack of business acumen that is behind so many of these failures.

It is not difficult to pick out as one travels the country roads, those garages that are, or seem to be, slated for failure. When the prospective customer is allowed to wait unattended on the floor for five or ten minutes after entering, impatiently blowing his horn, and finally has to get out and institute a search for some one to sell him some gas, surely something is wrong with the business end of the place.

When a man, a good customer, on asking for water is told that the bucket is "in the corner" and allowed to get it himself, there is evidence of lack of service. When the proprietor of a \$10,000 place has to spend ½ hour in a vain effort to locate a tire price list on which to base a sale, who can expect anything but ultimate failure? These things are within the experience of the writer, together with many others of like character. Any one who tours at all can easily parallel them.

As the converse to this unpleasant picture, I well recall a small establishment in a town of some 600 or 700. On entering I was immediately confronted by the genial proprietor who inquired my wants. I had come in for 5 gallons of gasoline; I left with ½ gallon of oil, a new spark plug for a spare, a tire cover, and 2 pounds of waste in addition to my gas.

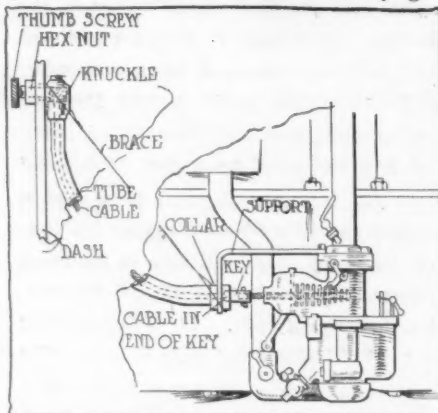


FIG. 1—DESIGN OF CARBURETOR CONTROL

Incidentally I had, and still have, a very pleasant recollection of that small shop. And I would be willing to wager that this little place is making good money in spite of the poor location.

Kicking notoriously is unprofitable. Will it not pay the dissatisfied garage owner better to grasp in some degree that spirit of service that is becoming the keynote of the motor car business, and in addition, try to apply to his business that degree of method and competency in management which he expects of his banker, his clothier, or his grocer?—C. D. Enfield.

PEUGEOT FASTEST CAR IN EUROPE

Reader Given Speed of Some American Makes—Most Expensive Car

Rochepot, Mo.—Editor Motor Age—What is the fastest stock car in this country?

2—What is the fastest foreign car?

3—What is the most costly American touring car?

4—What is the speed of the following cars: Pierce-Arrow 48, Locomobile 48, Lozier 72, Mercer model G?—William A. Hourigan.

1—National.

2—A Peugeot which traveled over 106 miles in an hour.

3—In the Buyers' Guide, printed in Motor Age issue of January 9, the Alco, 11-60 Berline was listed as the highest priced car, at \$7,250. If touring cars only are considered the Simplex, 139, listed at \$6,200 is the highest priced.

4—There are no records at hand to show the maximum speed of the Pierce-Arrow, 48, and the Locomobile, 48. According to the Chicago agent the Lozier, 72, is capable of attaining a speed of 70 miles per hour. The Mercer G will travel over 65 miles an hour according to the Chicago representative of the company.

A MANIFOLD DESIGN IN QUESTION

Reader Submits Sketch of Present Intake—Straight Connection Better

Brandon, Vt.—Editor Motor Age—I have a six-cylinder motor 5" bore x 4 ¼" stroke that has the manifold illustrated in Fig. 2. Do you think one gets as good results from one of this type as from one like the Pierce or Winton? These two have the same distance from carburetor to cylinder, while this does not.

2—I notice in a recent issue of Motor Age that triple-bolled linseed oil is recommended for mohair tops. Can you tell me where this can be purchased?—J. H. Cole.

1—As a general proposition, the shorter and more direct the intake manifold, the better. Consequently some of the more direct designs might give better results.

2—Any painter's supply house.

THE MOST EFFICIENT GEAR RATIO

Relation of Horsepower to Engine Speed and Cylinder Dimensions

Detroit, Mich.—Editor Motor Age—A car weighing 3,000 pounds has a motor developing 35 horsepower at 1,500 revolutions per minute. With 36-inch wheels what should be its gear ratio for efficient service?

2—What would be its speed with this gear ratio?

3—What power will a 4 by 5 L-head motor of standard design develop at 1,500 revolutions per minute?

4—How fast ought an ordinary motor of this size turn over under load?—A Subscriber.

1—A gear ratio of 3.5 to 1 will be about right.

2—At 1,500 revolutions per minute the car would travel 45 miles per hour.

3—This should develop about 32 horsepower at 1,500 revolutions per minute.

4—This depends on the load.

HIGH CRANKSHAFT SPEED POSSIBLE

Talbot Engine Turned over at 3,000 Revolutions per Minute

Grinnell, Iowa.—Editor Motor Age—Is it possible for a four-cylinder 4 by 6-inch motor to develop 2,600 revolutions per minute? In trying to sell me a new car a man claims that his 4 by 6-inch motor will develop 2,600 revolutions per minute. Will it do this on any speed, if a four-cylinder, four-speed transmission with direct on third and geared 2 1/4 to 1 on fourth speed?—J. H. Jones.

It is possible for a motor 4 by 6 inches in size to develop a speed of 2,600 revolutions per minute for a short time, if specially constructed for high speed work. Many motors can be speeded up this high but most of them give less power than at lower speeds because they are designed to operate normally at speeds much under this figure. The 25-horsepower Talbot, which broke the world's 1-hour record at Brooklands, averaged about 2,500 revolutions per minute for the hour, at times turning over at a speed of 3,000 revolutions per minute.

DESIGNS A CARBURETER CONTROL

Readers Makes Hand Control of Air Valve From Speedometer Parts

Springfield, Mo.—Editor Motor Age—I notice in the issue of May 8 an article from G. W. Swarting regarding an air adjustment for an E-M-F carburetor.

I have one on my car, a 1910 model, which I think far superior to the one given in the illustration. Mine, which I made myself from an old speedometer knuckle, tube and cable, and a clock key, is illustrated in Fig. 1. I do not remember the exact cost, but it was less than one dollar.

The knuckle used is a double one, ball bearing, from the wheel end of the tube, to which a piece of the tube is attached, long enough to reach from the desired position on the dash to the air adjusting screw of the carburetor. A screw was cut on the end of the knuckle projecting through the dash, fitted with a thin hex nut and a thumb screw. To the other end of the knuckle was fitted the speedometer cable, not the link kind, but seems to be of twisted steel wire, so that there is no slack in it; the other end of this cable was inserted into the end of a clock key which was drilled to fit, and sweated in. The adjusting screw of the carburetor was filed square to make a slightly loose fit to the square hole in the key, a small hole drilled through and pinned. An arm was soldered to the end of the tube next to the carburetor, bent and drilled to bolt on to the hanger of the carbureter, using the same

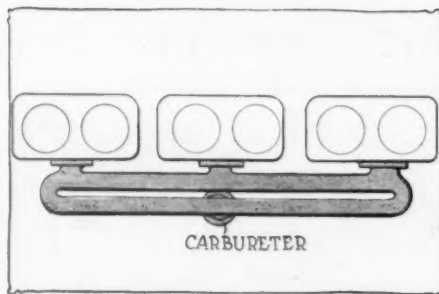


FIG. 2—MANIFOLD OF READER'S CAR

bolt that goes into the flange. This was found to be a little weak, allowing the tube to sag out of line, but by bracing it with a wire from the end of the tube to the knuckle on the dash this trouble disappeared. The wing nut was taken off the carburetor adjusting screw, and dispensed with.

With this device I can turn the valve screw in either direction and secure as fine an adjustment from the dash, while the motor is under load, as this carbureter is capable of.—Frank Lee.

UNFAIR PRICES FOR REPAIR PARTS

Reader States that Industry is Being Killed by High Upkeep Costs.

Newberry, S. C.—Editor Motor Age—The writer spent a pleasant half hour reading the article in Motor Age of April 24, by H. G. Cutler, on motoring possibilities in Argentina and Uruguay. His remarks on the repair problem were especially interesting. The same problem confronts us in this country, even more seriously than he depicted it there. Is it possible that we, living right here in the home of the motor car, are going to be outdone by them? For Mr. Cutler says, they are solving this problem down there.

Here in this town, a gentleman, who is perfectly able to maintain and operate a motor car, purchased one of high grade a few weeks ago and after owning it for only about two weeks, sold it at a loss, giving as his reason that it would take too much money to keep it running.

Not so very long ago the writer was talking with another gentleman, who also is able to own a car, who expressed himself in this wise, "I would not mind buying one, but that is the smallest cost attached to it. I cannot afford to be pulled by the repair men."

Did Motor Age ever figure out what a car would cost if the parts were bought as listed by a given maker, and notice the difference in what it would cost as compared with the first cost of the car? I have and the difference was truly startling. I heard a good business man say not so long ago, that he believed it would pay to make motor cars, and give them away, if he could find enough people to accept them, just to get to sell the repair parts. And how perfectly independent the makers of these repair parts are! It is no use putting up a poor mouth and ask for any concessions in the way of reductions. They

know one must have them. The way they do lord it over a poor fellow! It's take it or leave it with them, for they know one must "come across."

Take a car that sells for \$600 or \$700 f. o. b. the factory, and figure out the cost of the motor alone. It will amount to within \$100 or \$200 of the cost of the entire car, which does not take into account the cost of assembling it. There is something radically wrong and it is crippling the motor car trade very much more than the makers are aware, or they would get down off of their high horses and "tote fair."—J. Alex. Meldau.

GREASE LEAKS ONTO BRAKE BANDS

Due to Too Much Grease Usually—Felt Washer Missing

Chicago, Ill.—Editor Motor Age—I have a model M Oldsmobile and have trouble with grease leaking out along the shaft and getting on the brake bands. The grease does not come through the felt washer, but works through the threads where the cone of the bearing screws into the axle tube. How can this be taken care of? Should not the gear housing be tight around the shaft so as not to let grease out?—Sylvester Sparling.

In all probability there is too much grease in the housing and this is forced through the axle tube onto the brake bands. The first thing to do is to cut down the supply of grease. Do not substitute thin oil for the grease, for thin oil will run also through the tube and then to the brake bands. There should be a felt washer in the cup that holds the bearing on the axle shaft.

MISSOURIAN WANTS RACING DATA

Interested in Abbott-Detroit 1911 Racing Cars—Speed Given

St. Louis, Mo.—Editor Motor Age—How did the Abbott-Detroit cars finish in the Vanderbilt cup and Grand Prize races of 1911? If they didn't finish, were they running when the race was called?

2—Were they stock cars?

3—What is the maximum speed of the Abbott 44-50? Of the Cadillac?

4—What is the weight of the Abbott 44-50? Of the Cadillac?

5—Has Motor Age ever published a description of the Abbott cars? If not, will such a description be published?—R. E. B.

1—In the 1911 Vanderbilt an Abbott-Detroit driven by L. A. Mitchell finished the race. Another Abbott driven by C. Limberg went 266.27 miles. At Savannah for the Tiedman cup an Abbott-Detroit, driven by M. Roberts, completed six laps of the ten-lap race. H. L. Hartman in an Abbott-Detroit completed but one lap.

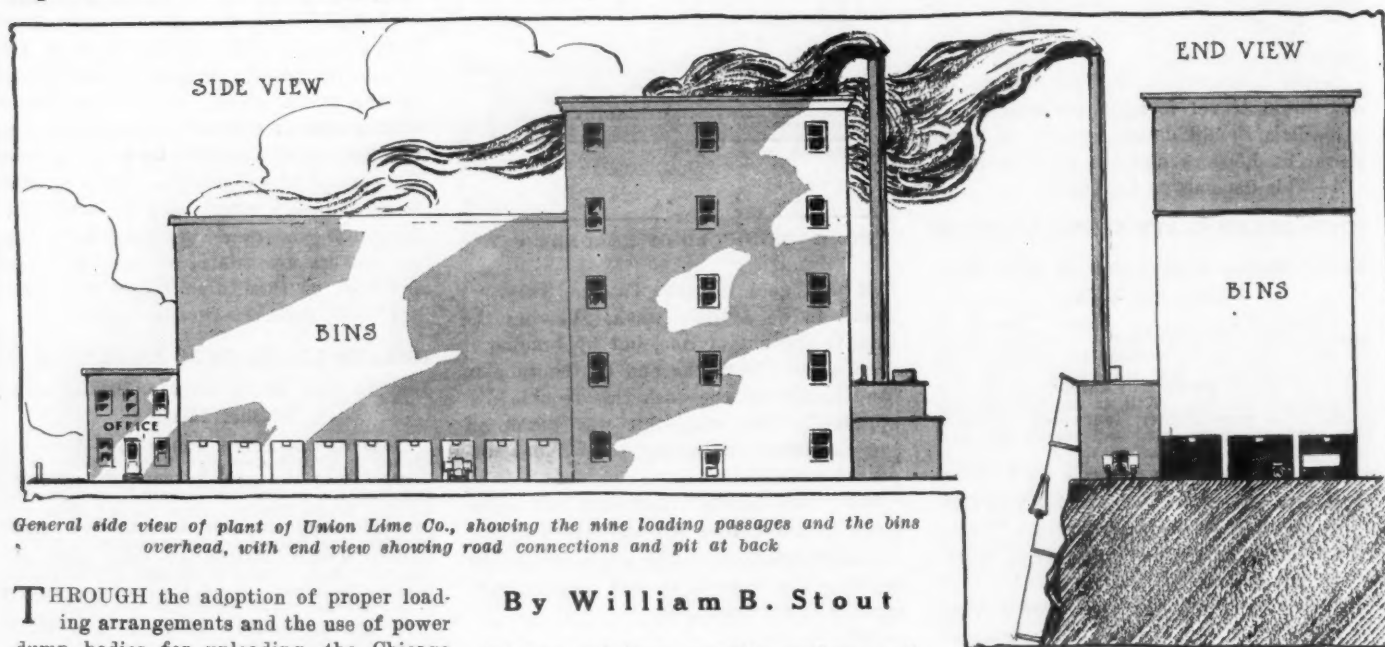
2—Although the races were non-stock races, the Abbott-Detroit company claimed that the cars were stock. They asserted this in their advertisements and were suspended from racing for 6 months for doing so.

3—According to the Chicago agents, the 1913 Abbott has been driven 55 miles per hour and the Cadillac over 60 miles per hour.

4—The Abbott touring car fully equipped, including extra tire and with all tanks full, weighs 3,850 pounds. The Cadillac weighs 3,900 pounds, according to the Chicago agent of the company.

5—The description of the 1913 Abbott appeared August 1, 1912.

Special Loading Arrangements Save Truckmen Money



General side view of plant of Union Lime Co., showing the nine loading passages and the bins overhead, with end view showing road connections and pit at back

THROUGH the adoption of proper loading arrangements and the use of power dump bodies for unloading, the Chicago Union Lime Co. has cut its hauling costs one-third and is able to load a 7½-ton load in less than a minute and unload in half that time.

Motor trucks for this firm make as many as sixteen trips a day with full load, as against four to five for the horse wagons with 4-ton loads. The work of one 7½-ton truck has been so successful that two new machines have just been added to the fleet, these being of 6½-ton capacity.

The Chicago Union Lime Co. has dug a hole some 400 feet deep and a quarter of a mile square in the very heart of Chicago, having blasted it out from the solid rock during a long term of years in process of obtaining crushed stone, lime and the lime for Chicago consumption. Hauling away the crushed stone by horses finally proved an expensive matter, so motor trucks have been put on the job and have more than made good.

Idle Time Is Waste Time

It is an axiom of motor truck use that all idle time of the vehicle is waste and to obtain results one must cut as short as possible the loading and unloading time. In this matter the lime company possibly has a record, for on a recent trip, as stated above, the writer timed the loading of 7½-tons at just 58 seconds and the unloading at 38. How this is accomplished is interesting, but to understand it a description of the plant and its arrangement is necessary.

The great hole is inclosed in a big high-board fence, making the place look to the outsider like a big ball park. At one corner the crushing plant is placed. This is situated close to the edge of the yawning excavation on whose purple floor may be seen dots moving to and fro as the men are at the work of digging and drilling below. A regulation mine cage makes continual

By William B. Stout

trips up and down, carrying workmen and material.

At the side of the crushing plant are the storage bins, newly built, of solid reinforced concrete, forming a continuous building with nine doors, openings, or tunnels below. The floors of the bins form the ceilings of the tunnels and in each tunnel there are four chutes to be used, depending on the location of the wagon loading. This indicates thirty-six bins. Each of the bins contains a different grade or size of material and a truck coming in takes a position underneath to correspond to the load ordered.

Road Needs Repairing

While waiting for the motor truck to arrive the writer watched four wagons load with an approximate 4-ton load each in 3 minutes, one man doing the work. The main delay seemed to be in getting into the tunnels from in front, where the road was in awful condition; some 10 inches of sticky mud directly in the way. A few dollars of expense could put this road in shape and save much delay in getting in.

The motor truck at last arrived, a Mack machine of 7½-ton capacity, although the body was smaller than the usual 3-ton machine in other lines, on account of the load density of course. The machine took 1 minute in getting in, and was then loaded.

To load the device shown in the drawings is used, this being the hopper—above mentioned—having shutters below pivoted at the hopper center. A bar runs off to one side and has on the end a double-ended lever L with a chain loop hanging below. When a machine or wagon drives



in, this chain hangs down at the side, and the man whose duty it is to load pulls on the end of the chain, thus drawing the swivel shutter above aside. This clears the opening above, depending on his pull on the chain, and opens the chute so that the stone falls from the bin above like a stream of water from a faucet. Opening the chute pulls up a length and weight of chain on one side, so that when the loader lets go the chain it automatically shuts the hopper shutter above.

Pulling on this chain, the rain of crushed stone came down into the big motor truck and in 58 seconds was stacked high on the box body. Weighing as the truck pulled out the load was just 7½ tons, and contained 6 yards.

The machine, running at about 8 miles an hour, arrived at its destination 4 minutes later, the stone going to a construction job on the street not quite a mile from the plant. A 1-minute wait was made to find where the load went, and another minute was taken to get to the place. The machine was fitted with a power dumping body, and after turning on the power most of the load was off in 15 seconds. Some failed to slide, so the driver backed his machine suddenly up against the pile of stone he had dumped, which started the rest of the load, taking 28 seconds in all.

Impressed the Buyer

The smile on the buyer's face as he signed the delivery slip told much as to the advertising value of delivering goods in so up-to-date a manner, while he stood better with his men for having used the modern way. While the workmen stopped to watch the unload, it took but half a minute and helped discipline and the spirit of the job. That man always will order from a firm using motor trucks hereafter, one could see by his expression. Quite a

crowd collected also to watch the machine work.

The same machine was used in delivering a large amount of stone during the building of the new Hub building in Chicago, and according to the driver, was given every help and encouragement by the traffic police of the district in getting into place for unloading, as they were glad to see it do the work, and bring so large a load with so little holding up of other traffic movements about a spot then crowded with every type of hauling vehicle. Here loads were left and the truck away again with signed bill in as short a time as 52 seconds.

Possibilities of the Truck

The motor truck unhindered can make on the average twelve trips a day with the 7½-ton load, against five trips of horses with 4 to 4½-ton loads. Three-horse wagons carry 7 tons. The motor truck has been hindered, however, from making the full quota of trips through contract arrangements with teamsters. These worked on contract for a minimum number of runs per day, so that when business was slack the teams could handle a lot of the work that ordinarily falls to the truck, and at no extra expense, as the teams have to be given this work to keep to the minimum trips of the contract. In busy seasons, however, the machine has made as high as 66 miles a day, making fifteen trips. On this day the work continued 9 hours 45 minutes.

The machine used is fitted with extra large tires, 7-inch dual block tires being fitted to the rear and 7-inch singles in front. Tire costs are given separate, these being the figures of the lime company, but they have been bettered recently, the tire cost being reduced to 5¼ cents per mile.

The figures of costs on the truck, which has now been in operation 1½ years, are given below:

Depreciation figured on estimated life of truck of 100,000 miles, or 5.7 cents per mile.

General repairs figured on 4 cents per mile, leaving a reserve up to date of \$311.06 for general overhauling, which will be necessary in the course of the next 6 months.

General garage charges and insurance are not figured in on these figures.



Time, 9 months.
Mileage, 9,900 miles.

	Book figures	Money spent
Gasoline	\$ 472.05	\$ 472.05
Oil and grease	170.07	170.07
Driver	869.71	869.71
Repairs, current	88.27	88.27
Repairs, general	406.70	95.64
Equipment, extra	49.00	49.00
Tires	865.80	885.67
Depreciation	563.00	.....

Total cost\$3,484.60 \$2,630.41

The gasoline consumption was 3,761 gallons, averaging 12½ cents a gallon.

Miles, 9,900 at a total cost of \$3,484.60, or 35.2 cents book figures; actual cost, \$2,630.41, or 26.6 cents per mile.

Gasoline, miles per gallon, 3.7 cents at 12½ cents, or 4.75 cents per mile.

Oil and grease, 1.72 cents.

The fine showing made by this machine has led to the purchase recently of two more motor trucks, these being 6½-ton Saurer machines, and it is the intention later to operate almost entirely with motor delivery.

Motor Spirits is used on the machines, giving, it is found, 4 miles per gallon on the 7½-ton machine, as against 3½ of the gasoline.

STEWART MAKES ASSEMBLY RECORD

Taking apart a finished motor truck and re-assembling it between 3 o'clock and

quitting time is the record recently made by the assembling force of the Stewart Motor Corp., Buffalo. A car in actual service, belonging to the Sinclair-Rooney Millinery Co., of Buffalo, was selected for the test, the object being to demonstrate to this company and other prospective Buffalo buyers the truth of the Stewart salesman's claim that repairs could be made in an incredibly short time through the system in vogue at the factory.

The car was brought to the factory early one afternoon and work was begun at 3 o'clock. Between that hour and closing time the body was removed, the motor taken out of the frame, the transmission, rear axle, front axle, steering gear—all were removed. Brake rods, fenders, etc., were detached, until nothing was left but the naked frame. Then the workmen started in to put the car together again, replacing the various parts, and finally put back the body. When the men went home to supper the car was finished and was driven off to the owner's garage.

Proof that the work was well done, in spite of the short time allowed, is found in the fact that the car went on its regular run the next day, and has been in constant service ever since, operating in and about the city of Buffalo.

A NEW USE FOR MOTOR TRUCKS

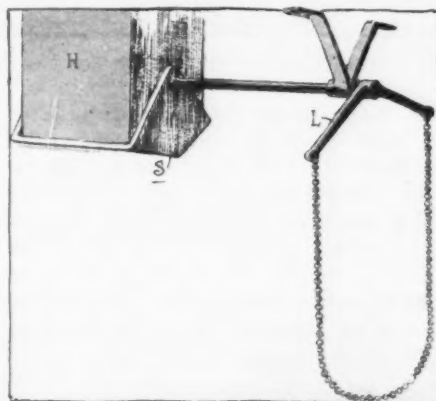
Collecting money by motor car is one of the new uses to which Stewart motor delivery trucks are now being applied. The New York Telephone Co. has just purchased from the Stewart Motor Corp., of Buffalo, a 1,500-pound capacity delivery car, fitted with a special body and used for collecting nickels and dimes from the automatic telephone pay stations.

This car is fitted with a panel body, with solid wire doors at the front and stoutly locked hinged doors in the rear. The interior of the body is fitted up as a counting room, in which two clerks work continuously, counting and sorting the money and making records of the returns from each pay station.

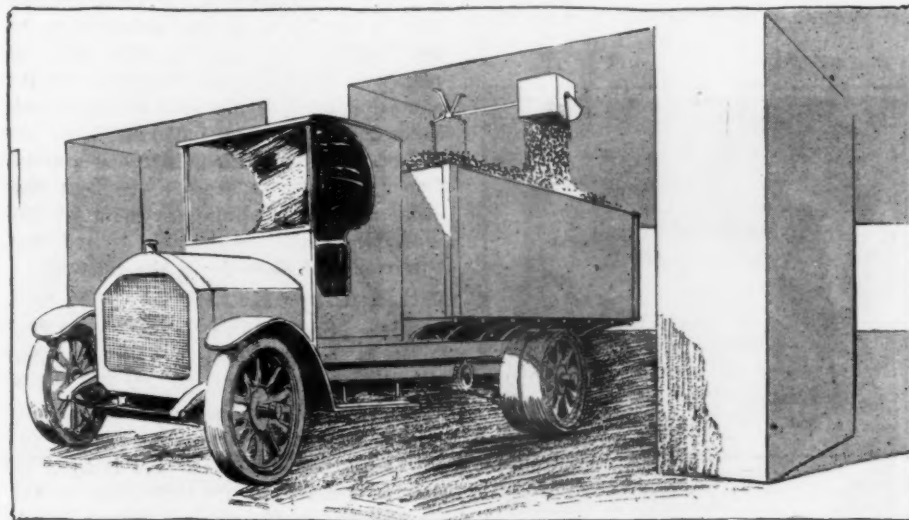
In addition to the money car, the New York Telephone Co. has purchased nine more Stewart delivery trucks, fitted up as emergency repair cars, with ladders, coils of cable, rope, extra telephones, etc.

FAST DELIVERY BY TRUCKS

One hour and 15 minutes was consumed by a Kissel 4-ton truck equipped with a dump body in delivering a full load of lumber to a destination 7 miles distant and returning to the starting point. The work was done for the South River Brick Co., of South River, N. J. The same day a team of horses hauling a 2-ton load of lumber, half the burden carried by the truck, occupied 4 hours and 30 minutes in making the identical trip. On this basis, the usual time consumed by horses on the trip in question—it would take 9 hours to deliver by horses the same tonnage that the truck delivered in an hour and a quarter.

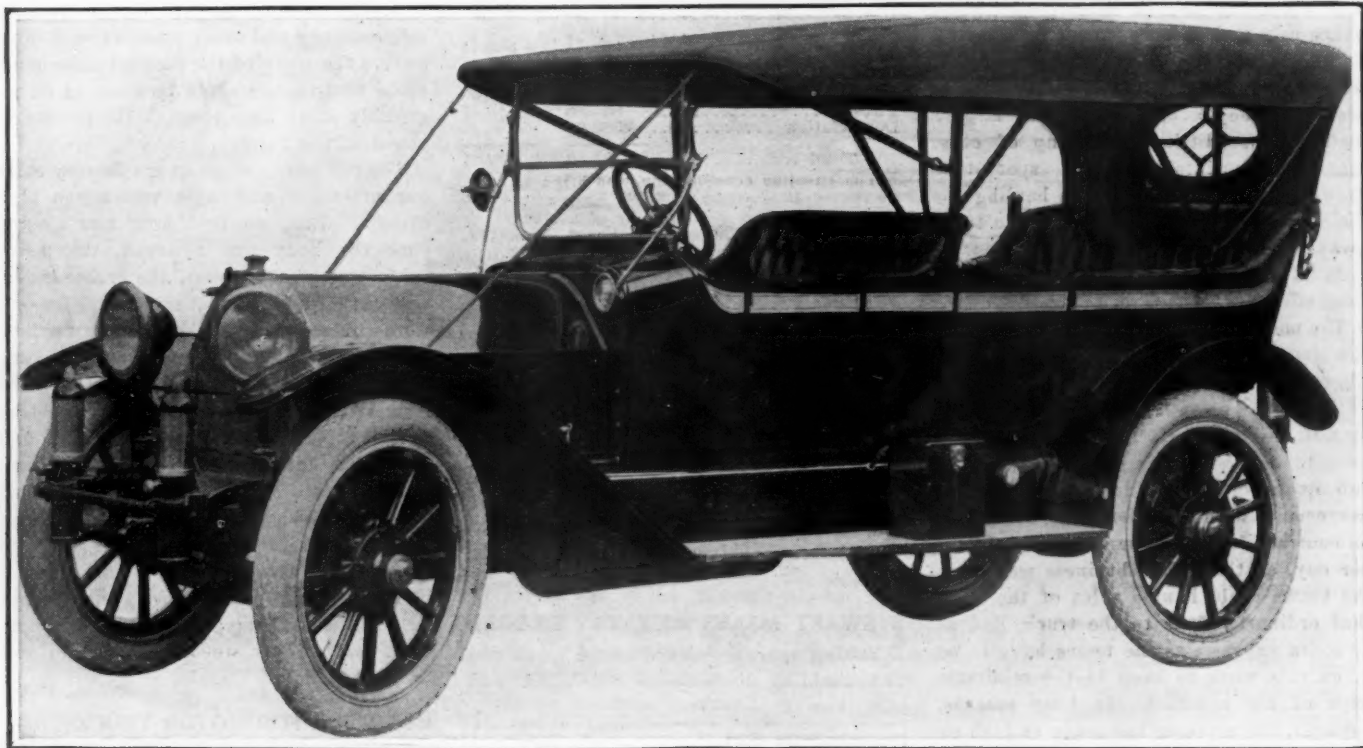


How chutes are opened by pulling of chain. The lever L connected to the shutter S draws this aside, letting crushed stone down through hopper H



A truck is here shown in the loading passages, the hopper above being open. In this way 7½-ton vehicles are loaded in less than 1 minute

A Six Leads Pilot Line for 1914 Season



PILOT SIX, SHOWING ADJUSTABLE LAMPS AND WESTINGHOUSE AIR SPRINGS

WHEN the officers of the Pilot Motor Car Co., at Richmond, Ind., called their product "The Car Ahead," it was in no sense meant to be an ambiguous phrase, as may appear at first. They dubbed the Pilot car so not because it might race ahead of any car on the road, but because it was thought to be ahead in point of construction and design. A trip through the Pilot factory results in one believing that the manufacturer is tending toward a one-piece car. In other words, simplicity of construction is the dominant feature. In places where wedge pins or bolts are used ordinarily, it was deemed advisable to braze, this being true especially of such parts as clutch and brake pedals. This integral building of the chassis is well up with the ideas of motor car engineers. Perhaps the builder would not be altogether wrong if he assumed that his product is capable of being the car ahead on the open road, for a trip from Richmond to Hagerstown, a distance of 17 miles, was negotiated in about 19 minutes in a six-cylinder Pilot test car. Although there were no shock absorbers on the car, it rode exceedingly well over the none too good road to Hagerstown.

Aside from endeavoring to bring the car to a high state of mechanical perfection, the Pilot company has spared no expense in making the car one that is equipped fully.

Has Teetor Motor

In the selection of a motor, the Pilot company had little trouble. The plant of

the Teetor Motor Co. is at Hagerstown, 17 miles away, and the test cars of the company are used sometimes to haul finished motors to the Pilot factory, and when test cars are not available there is little outlay in bringing the motors to the plant by freight. All the block testing of the engines is done at the Teetor plant, the motor after leaving being in condition for the chassis.

Three Models for 1914

The Pilot factory is at present manufacturing three chassis called respectively the 40, 50 and 60. The two first mentioned have four-cylinder motors, while the latter is a six, a comparatively new addition to the line.



WATER PUMP, P, AND INTEGRAL CONNECTION TO CRANKCASE, C

The six-cylinder motor has a bore of 4 inches and a stroke of 6 inches, developing 38.4 S. A. E. horsepower. The displacement of this motor is 452.4 cubic inches. The cylinders are of T-head construction and are cast in block and mounted upon a four-point suspension crankcase. In the matter of design the other two cars of the line are identical, the only difference being in the size of the motor and in the wheelbase. The 40 has a four-cylinder motor with a bore of 4.5 and a stroke of 5, and the 50 a bore and stroke of 4.5 by 6.

Returning to the six-cylinder motor, which is the feature of the Pilot line for 1914, a number of conveniences are to be noted. The crankcase oil level may be seen by a sight on the crankcase of the motor. It consists of a glass tube in which is an indicator. The indicator is at the end of a rod to which is attached a metal float. Any rise or drop in the float produces a corresponding movement of the indicator; hence one is able to tell just how much oil there is in the reservoir.

Carburetion and Ignition

Carburetion is by Stromberg model G-2, which is supplied with a hot-air intake. This is in the form of a flexible tube which runs from the exhaust pipe to the air intake, in that way supplying hot air for the carbureter. The fuel feed is by pressure or gravity, as the purchaser of the car sees fit. In the pressure system a tank suspended under the frame at the rear supplies fuel, pressure being maintained



BRAKING MECHANISM—HAND BRAKE, H, FOOT BRAKE, F, AND EXPANDING ARM, A

by a pump under the driver's seat. But 2 pounds is necessary to properly feed the carbureter. On the dash of the car is an auxiliary air adjustment, which is used to facilitate starting and to gain the proper mixture for different motor speeds. The carbureter is mounted on the right side of the motor.

Dual ignition is used, consisting of an Eisemann magneto and batteries. The latter are kept charged continually by a motor-driven Gray & Davis generator. This is mounted on an extension of the crankcase and is used also to supply current to a motor which cranks the engine. This starting system operates at 6 volts. The flywheel is toothed and by pressure on a pedal a gear of the starting motor is made to mesh with the toothed flywheel and thus turn over the engine.

Centrifugal Water Pump

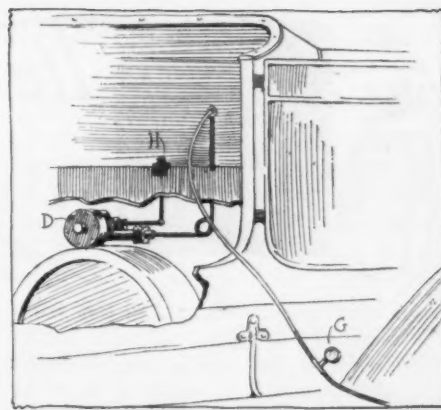
A very efficient water pump is used on the Pilot motor. In a recent test at the

Teetor plant the pump showed an output of 14 gallons of water per minute. The water is forced from the pump through a hollow in the crankcase and thence through a copper pipe to the cylinders. The pump is of the centrifugal type and is geared directly to the motor through the camshaft gear. The magneto is mounted above the pump and is driven by a gear in mesh with the pump gear.

The motor, together with the gearset, is mounted on a sub-frame which extends two-thirds the length of the chassis. The drive is through a cone clutch to the gearset, which is located amidships. This is of the three-speed selective type and is manufactured by the Warner Gear Co. Here is shown again another point in economic manufacture. The Warner Gear Co. is located in Muncie, Ind., and the freight charges on gearsets to the Pilot factory is not a great factor in determining the selling cost. It will be noted that the Pilot parts are bought of companies not far from the assembly plant, this being so not only because it affects a saving in the yearly freight bill, but because the home plants are well-known parts makers.

Running Gear Detail

In the Pilot six the drive shaft has two universals, the forward one being located directly behind the gearset. The rear end is manufactured by the Hess Spring & Axle Co., an Ohio concern. The axle is of the floating type, runs on ball bearings and is housed in a pressed-steel case. Accessible hand holes are provided in the axle housing to permit of differential adjustments. There is attached to the axle casing a V-shaped torsion member which terminates in a cross-member of the



PILOT FRICTION-DRIVEN TIRE PUMP

frame. Here it is fastened by double springs.

Both hand and foot brakes are of the internal expanding type and are rabestos faced, the feature of the brakes being the turnbuckle adjustment near the end of the brake rods. Another feature is the brake equalizer, which operates only on the foot brakes.

The Pilot six has a clearance of 11 inches. Tending to live up to its slogan, "The Car Ahead," the Pilot company is expected to adopt the Vulcan electric gearshift. Experimenting with this device has been going on, and from all appearances the results have been satisfactory. This means that the hand shifter lever will be set aside and buttons substituted. Pressure on the buttons shifts the gears.

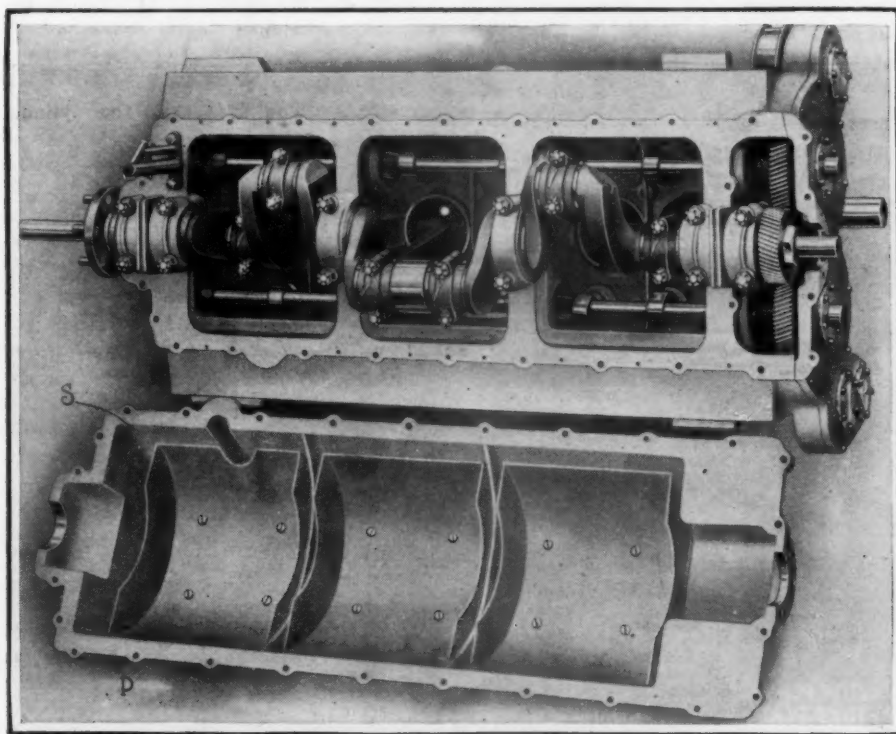
When referring to equipment the word fully may be used with safety, for such conveniences as dash insert lamps, trouble lamp and cigar lighter are among the appurtenances. An arrangement by which no one can start the motor with the switch on battery side is provided in the form of cut-out plug. With the plug out of position it is impossible to start the motor except by spinning on the magneto.

Odd Headlight Construction

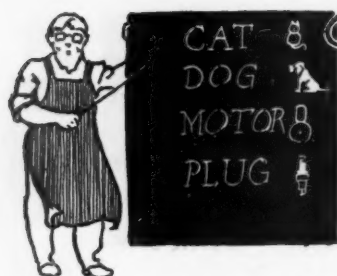
The headlights are made so that they turn as the steering turns. However, the feature of this system is that but one lamp turns. That is, if the car turns left the right lamp remains still and illuminates one road, while the left lamp turns and lights up the road upon which the car is to turn. A back reflector is also part of the equipment.

The tire pump, which is illustrated here, is a Racine pump driven by friction disk. By turning a handle on the dash the friction disk touches the flywheel and starts the pump in operation. Referring to the illustration at the top of this column. By turning the knurled knob, H, the disk D is pressed against the flywheel. This revolves the disk which in turn operates a piston. Before the air reaches the tire the pressure is measured by gauge G.

For the coming year a new six-passenger body is offered. The Six has a wheelbase of 132 inches and is fitted with 37x4½-inch tires all around. The Pilot six weighs 3,650 pounds with equipment.



BOTTOM VIEW OF PILOT SIX MOTOR, SHOWING HELICAL TIMING GEARS, ALSO OIL PANS, P, AND OVERFLOW SUMP, S



The Motorist's Kindergarten

EDITOR'S NOTE—Motor Age is publishing in this department a series of non-technical explanations of the various parts of motor cars for the benefit of the reader who knows nothing about them. The subjects will be dealt with in the most elementary manner, so that the series when completed will form a simple elucidation of the car. The first article appeared October 10, 1912.

As mentioned in Motor Age last week, there are two types of clutches in general use. The cone clutch was described. The disk type will be taken up now. As the names implies, a disk clutch is composed primarily of a number of disks or flat plates. These plates may be either of metal or metal covered with some non-burnable substance such as asbestos fabric, which is used for brake bands.

In the cone clutch the leather friction surface on the outside of the clutch presses against the flywheel, but in the disk clutch instead of pressing the flywheel there are plates already fastened to the flywheel, and these plates are pressed by other plates. Suppose you were to take two large silver coins and revolve them and then suddenly place a third coin between them and press the two outer coins against the one in the middle. That is just the action of a disk clutch. The rubbing together of disks or plates.

In Fig. 66 is shown the parts of a simple disk clutch. Any number of plates may be used. In fact, one car has a clutch with more than 40 plates, and another has but three.

Parts of the Disk Clutch

The Packard disk clutch is typical of this type. The different parts of the Packard clutch and their position will first be taken up and then their action in the assembled clutch. A part called a spider is a portion of the disk clutch. This is nothing more than a hollow cylinder with a flange at the bottom. On the outside of this hollow cylinder are a number of keys. These keys are oblong-shaped pieces of metal and they are riveted to the spider. The keys are about $\frac{3}{8}$ -inch square at the end and about 4 inches long.

The disks for the spider look like that shown at C in Fig. 66. It will be noticed that there are little notches on the inside of the plate. These notches slip over and hold onto the keys of the spider. Now every other plate is a spider plate. Between each two spider plates is what is called a drum plate. A drum plate is shown at D. It will be noticed that it has notches on the outside. First a spider plate is put on and then a drum plate until all the plates are on the spider. After all the plates are on, a clamp of some sort is put over them to keep them from falling off the spider. This clamp is held fast by a powerful spring. Fastened to the spider and running through it is a shaft.

Now, the drum of the clutch is fastened to the flywheel of the motor with bolts,

The Multiple-Disk Clutch

through holes H. It also has keys riveted to it exactly like the spider. It was said that every alternate plate was called a drum plate, and that these drum plates have notches on the outside. The reason the notches are on the outside is because these notches fit over and hold onto the keys of the drum. They fit just like the plates of the spider, only instead of fitting on the inside they fit on the outside.

Drum Plates Not Free

It is evident that if the drum plates are permanently fastened to the drum and the drum is permanently fastened to the flywheel of the motor, if the flywheel turns around the drum plates must turn around. This is true always.

The spider is fastened to a shaft which is indirectly part of the drive shaft of the car. The end of the shaft, which appears at the right of B in Fig. 66, rests in the center of the flywheel of the motor. There is a pedal attached to the clamp of the clutch and this pedal is called the clutch pedal. When this pedal is pressed it pulls back the clamp of the clutch by forcing the spring back. This separates the drum plates from the spider plates. It was stated before that the spring pressing against the clamp held the plates together; now by releasing the pressure on the clutch

spring the plates are permitted to separate.

Let us suppose that the motor is running and there is not pressure on the pedal. This means that the drum plates are turning, for they turn as long as the flywheel turns. But the powerful spring is pressing against the plates and holds them all together. This means that the spider plates are being held firmly against the drum plates. Therefore, the spider plates are turning. And the spider plates being fastened to the spider permanently and the spider being fastened to the shaft permanently, this means that the shaft turns. Now this shaft runs right through to the gearset. In other words, when the clutch pedal is not being pressed the clutch turns the shaft around. If the speed gears are in mesh, the gearset turns the drive shaft which moves the car.

Releasing of Plates

When the clutch pedal is pressed the powerful spring is pushed back or to the left in Fig. 66. This releases the spider plates and the spider and drive shaft remain still and hence the car is not being propelled.

The drum plates are turning because the motor is turning, but the plates do not move anything because they are running by themselves. At A, in Fig. 66, is shown how the plates separate when the pedal is pressed. The big plates are the drum

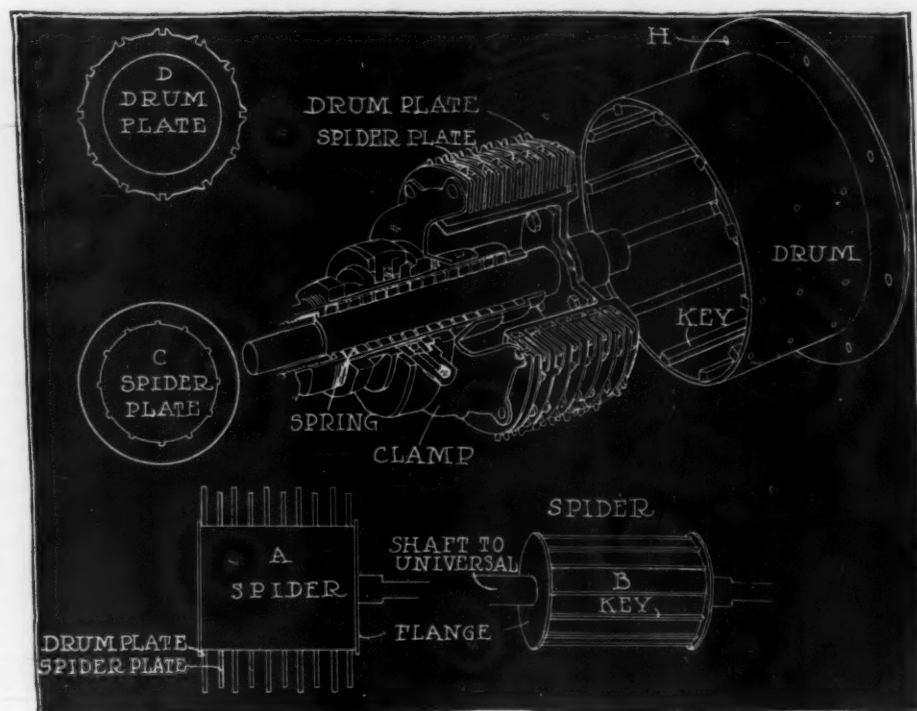


FIG. 66—PARTS OF MULTIPLE-DISK CLUTCH AND ASSEMBLED CLUTCH

plates and the little ones the spider plates. Now if the drum plates turn around they just turn with the flywheel and that is all. The spider plates are free because the power has been taken away from them. They get their power from the drum plates and the drum plates have been taken away by the pressing of the clutch pedal. If the spider plates are free and do not turn, then the spider does not turn because the plates are attached to the spider permanently. And if the spider does not turn then the shaft does not turn, for the shaft is attached to the spider permanently. This means that the car will not move when the clutch pedal is being pressed. As soon as you let go of the pedal, the spring presses against the clamp and the clamp presses against the plates and the whole clutch turns around and moves the

drive shaft, which, in turn, moves the car.

While the clutch just described is typical of disk clutches, few of them are exactly like this in construction, but all are alike in principle. Those having only a few disks are often called plate clutches, and those having seven or more disks are called multiple-disk clutches. Some are designed to operate in oil and others are designed to work without oil. The latter type are referred to as dry-plate or dry-disk clutches. Sometimes all the disks are of steel, but more often the steel disks are alternated with bronze disks.

Two other types of clutches are the expanding shoe type and the contracting band type. These are used on only one or two cars on the market, and act just like the expanding and contracting brakes, to be described later.

Manufacturers' Communications

Willys on European Situation

TOLEDO, O.—Editor Motor Age: Naturally it takes distance to lend perspective, and my trip abroad has enabled me to look at the motor industry in the United States from an entirely different point of view to that possible to one at home and constantly involved in the details.

I have gained an insight as to the conditions in Europe as they apply to motor-cars that is impossible without a somewhat lengthy trip and close personal investigation. I have discovered somewhat the feeling—perhaps it might be termed the continental feeling—against American products in general and motorears in particular, so much so, that were I to receive no other benefit from my travels, I can so plan our foreign business that apart from an instructive value its material value will more or less compensate for the time taken in the investigation.

I look upon the spirit among the manufacturers in continental Europe as largely one of jealousy. They are not accustomed to moving as we move, or employing machinery as we employ it, and when they learn of the wages paid to our employees they are simply staggered.

While they have many things from a mechanical standpoint that we have not, they lack, in my opinion, what we consider the strongest feature in our own factories—and that is the personal interest evidenced by every man employed there. In Europe the workmen are automats, who work at a speed that would be a joke in this country. It is true that the progressive European manufacturers are taking better care of their workmen in the way of physical benefits than they have ever done before, but they do not know such clubs as we foster—base-

ball, bowling, shooting, football, bands, glee clubs, etc.—nor do they realize the interest in their employment taken by men who spend some of their time at play, and who know that their employers appreciate what they are doing.

All Europe is somewhat jubilant over the proposed new tariff. While I did not have time to discuss many of its features, except that which concerned my own business, European manufacturers are almost unanimous in the belief that if the proposed schedule as it applies to motor cars goes into effect, that it will open a market to them hitherto beyond their dreams.

While it is true the duty on the completed motor car will only be reduced 5 per cent, the joker in the bill admitting completed parts at 20 per cent is the meat in the sandwich, and that duty will permit European manufacturers to import cars and sell them in competition with domestic product, the duty imposed being less than the difference in wages paid here and in Europe.

There is an immense field abroad for American cars, as no manufacturer outside of the United States has attempted the quantity production such as we and one or two others have. Our cars are lighter, and being made for American roads will last indefinitely upon the European roads, which subject them to only a fraction of the wear they encounter on the average highway here.

There is more or less disturbance in financial circles, due to the Balkan embroilment, and that has its effect here. The drain of gold to Europe is appalling, and that drain must in the near future be strongly in evidence in this country.

As to the progress in the way of motor car building, Europeans work along different lines to ourselves, having different conditions to meet. Working along those lines it naturally follows they have different ideas from ourselves, and I am so convinced that there is good in some of them, that I am sending our chief engineer to Europe for a lengthy stay, in order that he may absorb the latest ideas in construction and

embody those which prove of value in our later product.

The conditions as I see them in this country are, to say the least, a little disturbed. The incoming administration naturally will have somewhat different ideas from that just passed, and until the public is accustomed to the new way of working there will naturally be more or less unrest. It is difficult also to say what the change in the tariff will do, but I am firmly of the belief that this country is large enough to adjust itself to almost any circumstances, and while probably we, with others, will feel more or less a period of depression, due to these changes, I still believe—to use the vernacular—that it will all come out in the wash, and that with good crops this year the period of prosperity now enjoyed will be almost uninterrupted.—John N. Willys, President Willys-Overland Co.

The Motorists' Bookman

Horse Truck and Tractor

"HORSE TRUCK AND TRACTOR" is a book written especially, says the announcement for Horse-Owners who are finding their horse-profits decreasing, the collaborating authors being H. N. Casson, L. W. Ellis and Rollin W. Hutchinson, Jr. The first chapter of the book discusses the Horse Cost of Living, an introduction to the more detailed discussions following furnishing an array of figures which astonish the reader without boring him in a statistical way. Following this is a discussion of motor truck problems and accomplishments with methods of figuring costs, written by Mr. Hutchinson, chapters on the farm tractor and its place in agriculture and modern life by Mr. Ellis concluding. The book fills a want in supplying to the prospective buyer of motor trucks certain figures and facts as a basis of figuring his costs and the installation of motor trucks. That the truck illustrations are of the make of one company and nearly all the tractor photographs of one make of tractor indicates a publicity idea in the publishing of the book, which denotes enterprise on the part of the firms making these particular machines and detracts in no way from the particular facts which are discussed. F. G. Browne & Co., Chicago.

Church Architecture

"Our Homeland Churches" is a convenient book for the holiday kit of every foreign traveler, whether or not he or she be a motorist. It is of pocket size, profusely illustrated, and gives in concise and lucid form the history and development of English church architecture, and the different features of churches and their significance. The Homeland Association, Ltd., London.

With Accessory Makers

Goodrich Puncture Plug

B. F. GOODRICH CO., Akron, O., has brought out a puncture plug which is designed to plug small holes in inner tubes. The device resembles the button men use usually for the back of the collar. There is a nipple-like arrangement which when inserted into the hole into the tube tends to keep the plug in position. All that is necessary to heal a small cut is to pry open the hole and force the end of the plug into it. A small instrument is provided which facilitates spreading the hole in the inner tube. The chief feature of the plug is that but a portion of the inner tube is required to be removed instead of the entire tube, as is the case when vulcanizing is to be done.

Shumaker's Aqueous Vapor Device

By the addition of the proper amount of water vapor to gasoline vapor the J. T. Shumaker Motor Car Co., Rochester, N. Y., claims that its device known as a charge-forming device, or one for mixing water vapor with gasoline vapor, will make the motor of a car operate equally well regardless of atmospheric conditions. The device is shown in Fig. 2.

It consists of a water tank saddled over the exhaust pipe of the motor, and from this tank proper connections are made to the mixing chamber of the carbureter. The regulating valve is shown also in the illustration. With the evaporation of the water a certain amount of vapor is permitted to pass through the valve and into the mixing chamber of the carbureter, where it mixes with the gasoline vapor already there, the contention being that such a mixture consumes all the gasoline in the mixture, thus getting the maximum power from a given amount of fuel.

The maker claims also that carbon will not deposit, as the fuel is burned completely, and that because of the perfect combustion obtained by the use of the device the fuel saving is great. The maker states further that the device will save 25 per

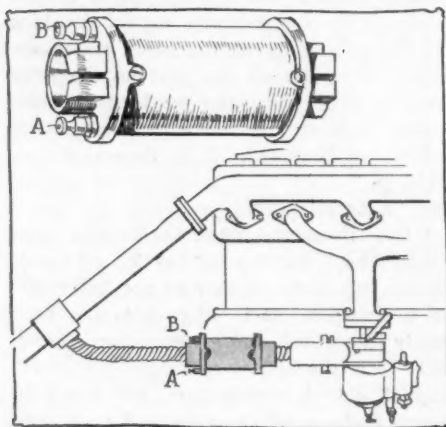


FIG. 1—ARNOLD VAPORIZER FOR GAS ENGINES

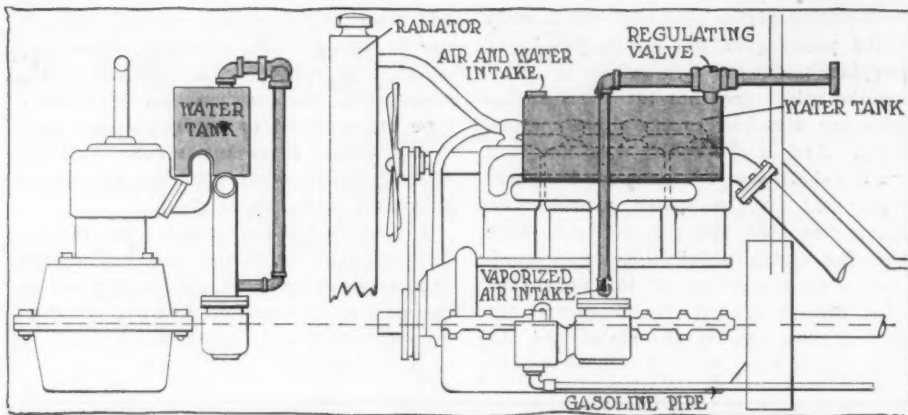


FIG. 2—CONSTRUCTION AND LOCATION OF SCHUMAKER'S WATER VAPOR APPARATUS

cent in the fuel bill, give more power to the engine and make the car handle easier.

Anderson New Inner Tube

Something novel in the way of an inner tube is being marketed by the Anderson Rubber Works, Anderson, Ind. The new tube is illustrated in Fig. 4. It consists of two plies of red rubber, the same as is used ordinarily in standard red inner tubes,

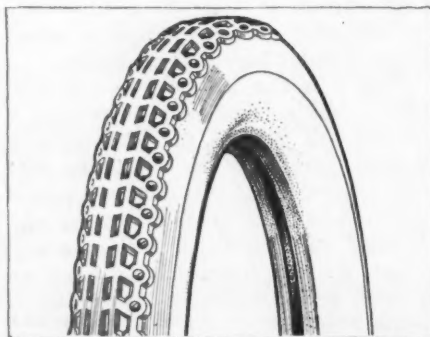


FIG. 3—MANSFIELD TIRE CO.'S NEW TREAD

and between these two layers is a layer of plastic gum $\frac{1}{8}$ -inch thick. The tube is called a self-healing tube from the fact that after a puncture occurs the plastic gum between the two layers of red rubber will run together and heal the puncture. The gum is raw rubber mixed in such a way as to make it soft and sticky. As soon as a puncture occurs the soft, sticky rubber runs together at the place of rupture, thus closing the hole and preventing an air leak. The entire tube is but $\frac{3}{8}$ -inch thick, the three separate parts being vulcanized together.

All-Right Radiator Cleaner

What is claimed to prevent corrosion of the water jackets of the cylinders of a motor is being marketed by the Aetna A. R. C. Co., Chicago, under the name of All-Right radiator compound. The substance is in the form of a cream-colored powder, which is mixed with the water of the

radiator in the proportion of two teaspoonfuls of compound to a radiator full of water. The solution is permitted to remain in the radiator a week, after which time it is drained and the radiator supposed to be cleaned.

Glazene Waterproofing Compound

The Glazene Co., Chicago, is marketing a transparent liquid known as Glazene which is designed to preserve and waterproof leather tops and seats. The maker claims that the substance does not crack the leather, and adds that it prevents cracking due to exposure to sunlight and variations in temperature.

Brooke Kerosene Carbureter

The Brooke Mfg. Co., Kansas City, Mo., has been formed recently for the purpose of manufacturing a motor attachment that permits of the motor being operated by kerosene and at the same time give more power at less cost than gasoline. The Brooke apparatus is shown in Fig. 7 installed in a motor. It will be noticed that the kerosene tank is located under the driver's seat. From the tank the fuel is led through a pipe to a float chamber, which is claimed to maintain a constant pressure of fuel on the heater pipe, which is inserted in the exhaust pipe of the motor.

The heater pipe runs through to the mixing chamber, which is above the intake manifold of the motor. In its passage from the float chamber to the mixing chamber the kerosene is heated, and after passing through the mixing chamber, is said to be vaporized by the action of the heat of the exhaust pipe near it. The kerosene is mixed with air in the mixing chamber. The kerosene vapor is sucked through the mixing chamber automatically just as the gasoline vapor of an ordinary carbureter is sucked. The device depends simply upon the heat of the exhaust for the vaporization of the fuel.

Initial starting is gained by the use of

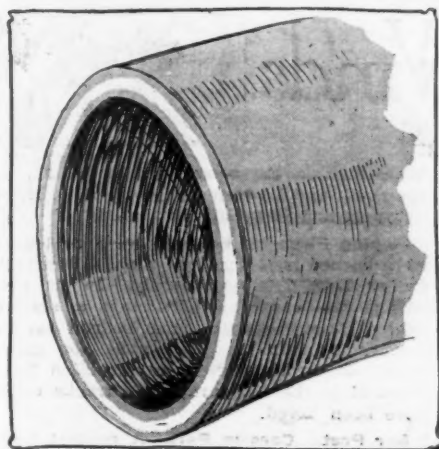


FIG. 4—ANDERSON INNER TUBE

gasoline. The engine is primed with this fuel, and after having gotten under way is run on kerosene. A number of successful tests have been reported by the inventor, A. O. Brooke, in one of which the car was throttled low and speeded up without any smoke appearing at the muffler end of the exhaust pipe, and after running 110½ miles the car showed a fuel consumption of 5 gallons.

Warner-Detroit Motor

A new company with H. L. Warner, founder of the Warner Gear Co., at its head, is manufacturing motors for the motor car trade. The plant is located in Detroit, Mich., and the first model is announced as a four-cylinder A-4-25. This product has a number of desirable features chief among which is the material of the cylinders and pistons. These parts are semi-steel castings for which an exceedingly long life is claimed. The bore of the company's first product is 3 3/16 inches and the stroke 5½ inches, giving it a displacement of 175.5 cubic inches. Cooling is by thermo-syphon system. The crank shaft is suspended from two points. Another feature of this motor is the removable cylinder heads which practice is in accordance with the ideas of some of the prominent American and Foreign engineers. The Warner-Detroit Motor Works expects to announce a six-cylinder motor shortly.

Mansfield Non-Skid Tire

The Mansfield Tire & Rubber Co., Mansfield, O., has announced a new non-skid tire, the tread of which appears in the form of five parallel cables connected by M-shaped cross-bars as the illustration in Fig. 3 shows. These cross-bars are set ¾-inch apart in order to get an efficient road contact. Between the cables and cross-bars are a number of depressions which tend by their sucking action against the road to prevent skidding. This new tread is applied on the Mansfield straight side, quick detachable and clincher tires. A number of tests

have been performed, it is said, and the tire showed remarkable non-skid properties.

Breeze Hot-Air Carbureter Attachment

An attachment by which any carbureter may be made to use hot air initially is being marketed by the Breeze Carbureter Co., Newark, N. J. Fig. 5 illustrates the device. The upper portion is clamped around the exhaust pipe while the lower cup-like part is placed on the air intake. Different sizes are carried so that no matter what the make of motor, a hot-air attachment may be fitted. Little skill is required to install the apparatus.

St. Louis High and Low Tire

The St. Louis Tire & Rubber Co., St. Louis, Mo., is marketing a peculiar form of truck tire which is called the dual high and low tire. This tire, which is illustrated in Fig. 6, consists of two tires on one rim. When the truck is empty the high tire does the work of carrying the load and at the same time takes up road

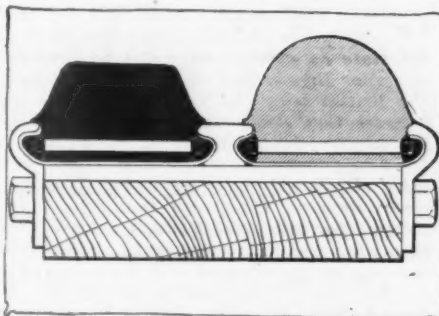


FIG. 6—ST. LOUIS HIGH AND LOW TIRE

shock, it being softer and more resilient than the low tire. The high tire compresses to the level of the low tire when the truck is loaded. Great efficiency is claimed for this type of tire because it provides for all road and load conditions.

Carborundum Valve Grinding Compound

The Gibson Automobile Co., Indianapolis, Ind., is marketing a valve grinding compound, known as Carborundum, in two forms. For those who prefer to mix the compound themselves, the material is put up in powder form. This powder when mixed with oil or grease is said to make an efficient valve grinding compound. The maker claims that the product is composed

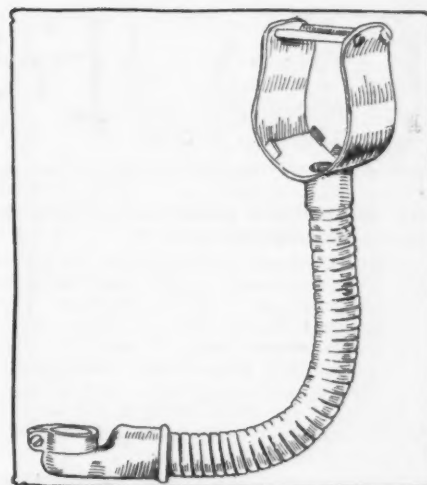


FIG. 5—BREEZE CARBURETER ATTACHMENT

of grains of carborundum and the product which is marketed in collapsible tubes is this powder mixed with grease. Two grades are offered, one coarse for initial grinding and the other fine for finishing.

Arnold Electric Vaporizer

The Arnold Electric Co., Boston, Mass., is marketing an electric vaporizer which is simple in construction. The apparatus is shown in Fig. 1 alone and installed on a motor. This electric vaporizer appears in the form of sleeve as shown in the upper illustration in Fig. 1. This is clamped around the intake manifold of the carbureter. Within this sleeve is a number of coils of wire of high resistance and when current from a 6-volt battery is passed through the vaporizer the coils become sufficiently hot to vaporize the fuel. A number of dry cells or the ordinary ignition battery is used to supply current to the vaporizer. The wires from the battery run to the device through a switch on the dash of the car. When the switch is closed current flows through the vaporizer and the heat generated therein is used to vaporize the fuel. The terminals A and B in the illustration are used for connecting the battery wires.

Rich Tungsten Valves

With valve trouble a common complaint among motorists the Rich Tool Co., Chicago, is paying attention to the proper proportioning of the materials contained in poppet valves. This company markets valves which are said to contain a high percentage of tungsten, the addition of which prevents the valves from warping and also hinders pitting. These valves are formed in one piece and are then put through a process, the idea being to toughen the metal and give it a great resistance to deformation. The heat treatment which they undergo is responsible for their toughness and their ability to stand up at high temperatures.

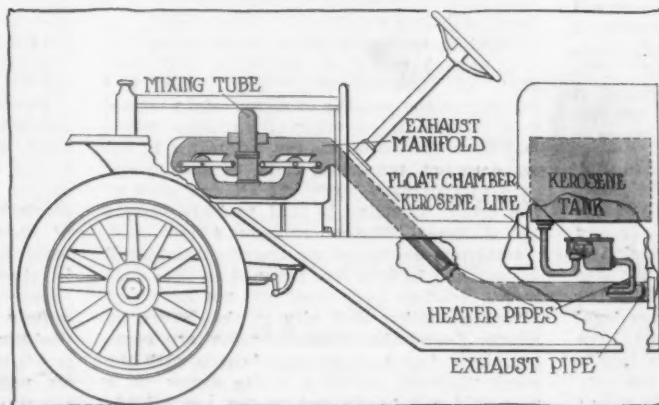


FIG. 7—INSTALLATION OF BROOKE KEROSENE CARBURETER



From the Four Winds



FINDLAY May Promote Races—A company is being organized at Findlay, Ohio, to pull off a series of motor races the week following the Indianapolis races.

Lower Gasoline Freight Rate—The United Fruit Co. has made a 20 per cent cut in its freight rate on gasoline between New Orleans and Puerto Barrios. This is the result of a protest made by motor car owners in Guatemala City. The government also has been asked to reduce the duty on gasoline so that the price, which is almost prohibitive—from 70 to 85 cents a gallon—may be reduced.

To Inspect Alabama Roads—What is to be the longest tour ever made in the state of Alabama is to begin June 9, when State Highway Commissioner W. S. Keller will make a personal inspection of the roads in every county of the state. The entire trip is to be made in a motor car. No less than 15,000 miles will be traveled, all within the boundaries of the state.

\$5,000 to Beach Race Victor—An offer of \$5,000 as a prize for a 200-mile motor race, which is to be the feature of the Galveston beach meet, set for July 28, 29 and 30, is expected to draw enough of the stars in the game to make the event a great drawing card. In addition, \$9,000 in other prizes is scheduled. Captain J. W. Munna will have charge of the races. The meet will be a part of the cotton carnival.

Motor Car Revival Worker—Religious workers in the rural districts of Illinois have decided to employ the motor car as an adjunct. The projection of community extension in this direction was inaugurated recently at Geneseo under the direction of A. M. Bruner, national secretary of the Industrial Evangelistic Foundation. Modern methods of spreading the gospel are being employed, the various crews making the trips in motor cars.

Rockford Leads in Cars—Of the cities of Illinois outside of Chicago, Rockford, with 45,000 people, claims the most motor cars, 941, according to the number of licenses issued in 1912. Decatur, with 31,000 residents, is second with 758; Springfield, with 51,000, is given credit for 704; Peoria, with 66,000, is allowed 646 cars; Aurora, with 29,000, has 628 cars; Danville, with 27,000, has 497; Joliet, with 34,000, has 473; Bloomington, with 25,000, has 439; Quincy, with 36,000, has 432, and East St. Louis, with 58,000, has 397.

Fix Iowa Tour Route—The route of the fourth annual Little Gladden tour of the Iowa Automobile Association has already been tentatively agreed upon. The tour will leave Des Moines June 23 and the cars will make a 6-day run over the state covering in all a little over 1,000 miles. Already more than thirty cars have been entered. This year a new departure will be attempted in that there will be two classes, one for factory cars and another for private owners.

Last Toll Has Been Paid—Whitefish Bay toll road, the conspicuous relic of the Stone Age at Milwaukee, Wis., passed out of existence May 20, on which date the city and county of Milwaukee came into possession of the highway. The purchase at \$15,000 was made several months ago, but pending the affirming of abstracts of title and other legal technicalities, the toll company has been charging toll and the road has gone into a bad state of repair. It will cost the city and county governments about \$50,000 to put the 3½ miles of road into good shape. The



GOVERNORS WHO MOTOR—BREWER OF MISSISSIPPI

GOVERNOR EARL BREWER, of Mississippi, is ambitious to make roads in his state as good as they are in England. Governor Brewer has motored extensively in the British isles and on the continent and believes that good roads are nearly as essential as good government. Few men in the state have covered more miles over Mississippi roads in a motor car than Governor Brewer. This very fact caused him to work for and carry through a large bond issue for road improvement. State and counties in Mississippi will have over \$5,000,000 invested in good roads before the end of 1913. Governor Brewer is an expert driver and has a thorough knowledge of his own car. At the suggestion of the governor, dealers are laying lines for a show next year, to be held in the state capital. By interesting farmers in motor cars, road questions will take care of themselves, declares Governor Brewer. The motor car has made country life 25 per cent more attractive, he says, and added to other conveniences that are coming within the reach of the farmer, is making rural life more attractive than city life.

road was built about 30 years ago and many years ago was paved with a bituminous macadam, of which practically every vestige has disappeared.

Safeguarding the Ferries—Provisions are being made to equip many of the flatboat ferries, which are in such common use in the interior of Louisiana, with guard rails which will prevent motor cars from going overboard in case of the sudden stopping or starting of the boat. Several motor cars have had to be raised from the bottom of a river or bayou recently for this reason.

Gasoline Is Exonerated—According to the 1912 annual report of the state fire marshal of Connecticut motor cars and garages to the number of eighty-eight caused fires. The total number of buildings which had been the scene of fires, according to the same report, numbered 2,515, so that motor cars and garages were but 3½ per cent of the total. Gasoline is said to have caused 108 of these 2,515 fires, or about 4.3 per cent.

Motorists Signboarding Lowell—The Lowell Automobile League has planned so that motorists heading for Lowell will not have any difficulty finding that city in the future no matter from what direction they are coming. In a few days 300 sign-boards with the word "Lowell" above a white arrow on a blue field will be erected on the roads leading to the city from Boston on the south,

Worcester on the west, Nashua, N. H., on the north and Lawrence, Lynn, Salem, Newburyport and Haverhill on the east.

Sloping Floor for Emergency—Four trucks were burned in the garage of the Liberty Oil Co. at New Orleans recently. In its new garage the company will build a sloping floor so that the trucks can be run out by gravity if there is any cause for quick work. Had this plan of construction been followed in the old garage the trucks could have been saved.

Bar Postal Cars in Park—A request from Postmaster Smith that postal motor cars be allowed the use of roads in Fairmount park to facilitate the delivery of parcel post has been denied by the Fairmount Park commissioners of Philadelphia.

Made Government Post Road—Governor A. O. Eberhart, of Minnesota, has designated the proposed scenic highway from Minneapolis to Mankato as the government post road and has filed the notice personally with the postmaster general at Washington. This will be the first state to get a part of the government's half million dollar offer for building of post roads. The state is to contribute \$50,000 to the government's \$25,000. The preliminary work has been mapped out by the state highway commission, and the money has been raised by the cities along the 100-mile route. St. Paul will build a connection to the road through Hennepin county.

Canadian Road Pact Made—The contract for the grand highway between Montreal and Quebec has been definitely granted to H. Beauregard of Montreal. The contract calls for waterbound macadam, and it is understood that the price exceeds a million and a half dollars. At the present time the engineers of the provincial roads department are going over the line of the projective highway ascertaining where there are inundations and whether preventative measures may be taken to keep the road from being damaged by floods after it is built. The government awarded the contract for the completion of the King Edward highway between Montreal and Rouse's Point of which some 15 miles remains to be built.

Marylanders Rejoice—The new improved roadway between Baltimore and Philadelphia will be opened about July 1. Secretary H. Milton Luzius of the Automobile Club of Maryland is preparing a map showing the present route between Baltimore and Philadelphia and also the permanent route to be followed after July 1 over the new road. This new route will be from Baltimore to Towson, to Loch Raven, to Glen Arm to Fork Village, to Kingsville, to Black Gap road, to Belair to Havre de Grace via Churchville to Perryville, to Northeast to Elkton to Newark, Del., and then to Philadelphia.

Horse Passing in Texas—According to reliable statistics which have just been compiled, there are 10,026 motor cars and other motor vehicles in the cities of San Antonio, Dallas, Houston and Fort Worth. The same statistical reports show that there is a total of 30,382 horses in these four cities. The total value invested in the 10,026 motor cars is about \$14,500,000, it is stated, and the value represented by the horses is approximately \$3,250,000. The total population of the four cities, according to the last census, is \$40,830. In San Antonio there are thirty-six people to each motor car, in Houston twenty-eight, in Fort Worth forty-five and in Dallas thirty-one. In San Antonio there

Recent Club News

THE annual meeting of the Springfield Automobile Club of Springfield, Ohio, was held recently and the following officers were elected: F. B. Houston of South Charleston, president; C. L. Bauer, vice president; George E. Mentol, secretary and treasurer.

The members of the Kewanee Motor Club of Kewanee, Ill., held a meeting to discuss plans for the acquirement of the proposed Cannon Ball trail between Chicago and Kansas City. It is desired that this trail be routed via Kewanee and if it is so routed, there will be improvements in the way of sign posts.

The annual run of the Syracuse Automobile Club of Syracuse, N. Y., will be held June 14. According to present plans, it will be a basket picnic. The run will be a secret time event and cars will be checked out at Syracuse and checked in at the scene of the picnic, leaving the members free to return to their homes when they please. The run is not confined to club members, all Syracuse motorists being invited to participate. The first prize is the Watson cup.

Two hundred motor car owners in Spokane, members of the Inland Automobile Association, are doing all the missionary work for the 1,300 motorists of that city. During the past week the club started an active campaign for new members. During the coming summer the association will have signs placed on the Apple Way to Coeur D'Alene City and on all the lake roads.

The motor car owners of Prosser, Wash., have recently formed the Prosser Automobile Club to promote good roads and to cooperate for the betterment of conditions for its members.

At the annual meeting of the Waukesha Motor Club, of Waukesha, Wis., C. A. Haertel, George L. Dwinne II and E. F. Bostwick were elected directors. The club is working to secure concrete pavement of several trunk streets within the city limits to meet proposed concrete roads to be built by Waukesha county, and has the support of Mayor Hawley W. Wilbur, who is a member.

The Geneva Automobile Club of Geneva, N. Y., has elected the following officers: President, Walter Howard; vice-president, John W. Mellen; secretary, Charles W. Fairfax; treasurer, William O'Hanlon.

Motor car owners of Rochester, N. H., have banded together and formed an organization with the following officers: President, George W. Young, vice-president, Dr. Dudley L. Stokes; secretary, Wallace Hussey; treasurer, John M. Stevens; directors, Charles D. Coleman, Gilbert F. Shaw, Ira G. Studley, Moses A. Fineeman, Levi Meader.

The Automobile Club of St. Louis has elected officers as follows: President, Edward M. Flesh; vice-president, George W. Tansey; secretary, Matthew Morse, and treasurer, Samuel Platt. The secretaryship and office of treasurer were formerly held by one official, but the increasing membership and activities of the organization were deemed sufficient to warrant the division of the offices.

The Bemidji Automobile Club of Bemidji, Minn., will make a tour June 3-5 which will include stops at Detroit, Minn., Fargo, N. D., and Crookston. Several motorists from the latter city will take part.

At a recent meeting of the Ontario Motor League of Ontario, Canada, four new directors—W. F. Firgh, Newmarket, Ont.; H. G. Bush, Port Hope; W. Y. Travers, Picton; A. H. Stratton, Belleville, were elected. One hundred and thirty new members joined.

is a horse for each eleven persons, in Houston a horse for each nine persons, in Fort Worth a horse for each eleven persons and in Dallas a horse for each fourteen persons.

Prohibit Smoking Near Cars—Owing to new ordinance, the Sarnia, Ontario, Ferry Co. has posted signs on the decks of its boats prohibiting persons from smoking on parts of boat where motor cars are being carried.

Rubber Tires Save Motorist—A broken trolley wire fell on Dr. A. E. Mann, of Findlay, Ontario, Canada, recently and but for the rubber tires on his motor car he would have met instant death. As it was, his neck was badly scorched.

Motor Mail Cars Efficient—Two motor cars used in the collection of mail in New Orleans have proven that they can handle the work of eight of the wagons which are in use. The test was made under the personal observation of John W. Fagan, the superintendent of mails, who has authorized the installation of two cars for the service. Other cars will be installed rapidly, until the entire collection service in the city has been put on a motor basis.

Coming Motor Events

CONTESTS

*May 29-30—Interclub reliability, Chicago Motor Club-Illinois A. C.

*May 30—Indianapolis speedway meet.

*June 7—Quaker City Motor Club and motor clubs of Delaware country interclub run; Philadelphia, Pa.

June 10—Reliability, Columbus, O.

June 14-15—Track meet, San Francisco, Cal.

June 12-13—Interclub match, Chicago Athletic Association-Chicago Automobile Club.

June 16-18—Reliability, Columbus Automobile Club, Columbus, O.

*June 19—Algonquin hill climb, Algonquin, Ill.

*June 21—Cincinnati, O., hill climb.

June 21-22—Track meet, Portland, Ore.

June 23—Iowa State Automobile Association tour.

*June 25-28—Chicago Automobile Club reliability to Boston, Mass.

July 1—Indianapolis to Pacific coast tour; promoted by Indiana Automobile Manufacturers' Association.

July 1-16—Motor plow competition, Winnipeg, Can.

July 4—Track race, Columbus, O.

July 4—Track race, Washington, D. C.

July 4—Track meet, Taylor, Tex.

July 4—Los Angeles—San Francisco road race.

*July 4-5—Track meet, Sioux City Auto Club.

*July 5-6—Road race, Tacoma, Wash.

July 12—French grand prix.

July 11-19—A. A. A. endurance run, Minneapolis to Glacier Park, Mont.

July 20—Track race, Seattle, Wash.

July 28-30—Galveston, Tex., beach race.

August 12—Kansas State Automobile Association endurance run to Colorado Springs.

August 29-30—Elgin road races, Chicago Automobile Club.

August 30-September 6—Reliability run, Chicago Motor Club.

September 9—Corona beach race, Cal.

September 1—Track race, Columbus, O.

September 21—French light-car road race, Boulogne.

September 25—Tourist trophy stock-car road race, Isle of Man, Great Britain.

October 4-11—Chicago Motor Club's Around Lake Michigan reliability.

*November 24—Vanderbilt road race at Savannah, Ga.

†November 27—Savannah grand prix.

MEETINGS

June 5-7—Mid-summer meeting S. A. E., Detroit.

June 23-28—International road congress, London, Eng.

†Sanctioned by A. A. A.

†Sanctioned by A. C. A.

Good Roads Activities

THE Colorado highway commissioner and advisory board held their second meeting last week and planned an apportionment of \$200,000 more among the several counties for road building this year. This makes a total of \$518,000 furnished from the state road fund thus far to aid the counties in this year's work of improving the principal highways in Colorado.

Some idea of the growth of the good roads movement in the state of Connecticut is had from the list of appropriations recommended by the appropriations committee to the general assembly. Of the total appropriations of \$12,846,575.82, the highway department is to have \$3,402,000 or approximately 27½ per cent. As a matter of fact the highway appropriation is the largest on the list. For instance education, and Connecticut takes pride in that especial system, is to have \$2,144,000, of about 16 2/3 per cent of the total and 63 per cent of the highway appropriation. Roads, rivers and bridges are named to receive \$105,200.

The Automobile Club of Minneapolis has assumed maintenance of the first section of the new federal postroad from the city limits to the next county. The county commissioners have set apart \$10,000 for this road toward which the government will give a like amount. This is to be part of the road from Chicago, through Osage, Iowa, and Austin, Minn.

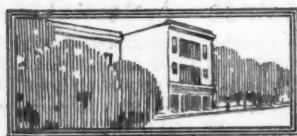
Motor car owners in the western part of Walsh county, N. D., at Park River, Linkin, Adams, Fordville and Fairdale, have combined to improve highways. The roads are to be laid out in districts and each town assigned to a district.

Lauderdale county, Alabama, has the distinction of being the first county in the United States to sign a contract with the government for a post road, under the recent provision, where the government furnishes one-third of the amount of cost. Thirty miles of road is provided in the agreement. The county puts \$20,000 on deposit and the government \$10,000. Government engineers are to have charge of the work, which is one of the requirements of the new regulation.

Enthusiasm over improving a bad stretch of road near Monte Vista, in the noted San Luis valley of Colorado, recently waxed so warm that several women and girls, not content with merely preparing lunches for the men who had volunteered to do the work, wielded pick and shovel and drove teams. The Colorado Good Roads Association says the 12 miles of road involved had been reported so bad that it took a mining prospectors' expedition 6 days to cover it with the heavily loaded supply wagons, and the organization praises the work of the Monte Vista citizens as a fine demonstration of civic pride—and equal suffrage.

In order to convince the lawmakers of Mississippi that good roads provide the most profitable place for the investment of state funds, a motor day has been arranged for the next session of the legislature. Tax records will be used in showing the assessed value of property along good roads as compared with the same properties before the improvement. More than 100 cars have been promised to take the legislators over the ground that they may have ocular evidence of the improvements.

Birmingham, Ala., motorists are bearing the expense of road improvement in Jones valley in order to reach Bridal Veil Falls comfortably by motor car. The new road will make possible a circuit of Jones valley by way of the falls and the great dam at Mulga.



Among the Makers and Dealers



Recent Incorporations in the Motor Industry

Boston, Mass.—Britton-Stevens Motors Corp., capital stock, \$50,000; incorporators, W. H. Britton, G. D. Stevens, C. F. Pinkham.

Boston, Mass.—Massachusetts Garage Association, capital stock, \$5,000; incorporators, J. Hathaway, C. I. Campbell, F. W. Boynton, J. E. Sevell.

Boston, Mass.—W. J. Connell Co., capital stock, \$15,000; motor car business; directors, J. Hathaway, C. I. Campbell, J. E. Savell.

Brooklyn, N. Y.—Atlantic Garage Co., capital stock, \$5,000; incorporators, J. M. Simon, C. Steinbeck, M. Steinbeck.

Brooklyn, N. Y.—Barber Auto Service Co., capital stock, \$10,000; incorporators, W. Barber, A. S. Barber, M. F. Barber.

Chicago—Vincennes Garage, capital stock, \$2,500; to operate garage and livery; incorporators, A. E. Lucius, E. B. Lucius, J. S. Matthews.

Chicago—Horwich Garage, capital stock, \$2,500; incorporators, S. M. Rosenberg, J. H. Edelson, A. M. Greenberg.

Cincinnati, O.—American Chauffeur Publishing Co., capital stock, \$5,000; incorporator, D. Rosenthal.

Cleveland, O.—Haupt Co., capital stock, \$5,000; to deal in motor cars; incorporators, W. D. Haupt, H. A. Couse, R. G. Curren, M. McManus, A. Clum.

Dover, Del.—Electromobile Co., capital stock, \$100,000; incorporators, H. E. Litter, W. J. Maloney, O. J. Reichard.

Fostoria, O.—Allen Motor Co., capital stock, \$500,000; to manufacture and deal in motor cars; incorporators, E. W. Allen, W. O. Allen, M. A. Thomas, O. P. Barnhart, J. E. Wright, G. E. Scroth, R. J. Christy, G. H. Baker, H. C. DeRose.

Flushing, N. Y.—Flushing Auto-Moving Express and Taxicab Co., capital stock, \$1,000; incorporators, N. Gilroy, J. Whitchee, R. Mills.

Jersey City, N. J.—Hudson and Bergen Automobile Co., capital stock, \$135,000; incorporators, R. W. Fulcher, C. Moller, A. A. Letts.

Newark, N. J.—Carbough and Mahon, capital stock, \$50,000; general motor car business; incorporators, E. D. Carlough, F. V. Carlough, F. Carlough, W. L. Mallon.

New York—Specialty Auto Parts Co., capital stock, \$5,000; incorporators, G. I. Aronow, A. M. Newburgh, A. H. Peyser.

New York—Square Motor Horn Co., capital stock, \$5,000; incorporators, S. Socnamillo, F. Buckman, A. Karlin.

New York—Universal Equipment Co., capital stock, \$50,000; to manufacture and deal in motors, etc.; incorporators, G. Gray, T. W. Hatfield, I. B. Owens.

New York—Marlburg Brothers, capital stock, \$50,000; to deal in motor cars, parts and accessories.

Pittsburgh, Pa.—Pittsburgh Hanes Automobile Co., capital stock, \$10,000.

Seranton, Pa.—Economy Automobile and Lackawanna Vulcanizing Co., capital stock, \$10,000.

Syracuse—Auto Radiator Co., capital stock, \$50,000; to manufacture radiators; incorporators, M. Kaman, Max Kaman, T. Vickers.

Toledo, O.—Toledo Merchants Delivery Co., capital stock, \$50,000; general delivery and storage business; incorporators, J. H. Pheatt, G. M. Reswick, H. W. Braser, L. F. Luecombe, J. E. Parsons, Jr.

Trenton, N. J.—Hall and Taylor Co., capital stock, \$25,000; general motor car business; incorporators, W. H. Taylor, H. A. Hall, H. Hall.

Wilmington, Del.—Victor Motor Car Co., capital stock, \$100,000; incorporators, M. D. Murphy, W. W. Day, F. E. Janvier.

HUMPAGE in New Line—F. R. Humpage, former president of the E. R. Thomas Motor Car Co., has become head of the International Color and Chemical Co., of Buffalo.

Contract for New Factory—The Gordon Rubber Co. of Canton, O., has awarded a contract for the erection of a plant to be constructed on Williams street. The plant will consist of two separate buildings.

Another Plant for Alliance—Ground has been broken for the construction of a plant for the Alliance Rubber Co. on South Mahoning avenue, Alliance, O. The contract calls for the completion of the plant within 10 weeks.

Findlay Trustee Named—After creditors of the Findlay Motor Co., Findlay, O., failed to agree upon a trustee in bankruptcy, Referee Bright has named B. W. Waltermire, trustee. It is said that the claims against the company amount to about \$50,000.

New Speedwell Factory Heads—To fill vacancies caused by resignations, B. F. Schmidt and L. R. Ingabrand have been advanced from foremen's positions to the positions of superintendent and assistant superintendent, respectively, of the Speedwell Motor Car Co.'s plant.

Adding to Detroit Tire Plant—Several of the sixteen new buildings which are contemplated as additions to the United States Tire Co.'s Detroit plant, the capacity of which will be more than doubled, have been completed and are being utilized in maintaining an increased tire production.

Consolidation Is Announced—The Lee & Porter Mfg. Co., Buchanan, Mich., recently consolidated with the Lewis Spring and Axle Co., Jackson, Mich. The Lee & Porter Mfg. Co. will surrender its charter and all its business in the future will be carried on under the direction of the Lewis concern.

To Double Plant's Capacity—The A. & J. Mfg. Co., of Binghamton, N. Y., has completed plans for the doubling of the capacity of its plant on Noyes Island. The firm recently placed on the market two new articles, a gas mixer and shock preventer, both of which are designed for use on motor cars.

Lamp Makers to Move—The John W. Brown Mfg. Co., Columbus, O., has purchased a new site on the outskirts of that city on which it will soon erect a modern factory for the manufacture of motor car lamps. This move has become necessary on account of the location of the old plant in

the business center of Columbus, the land in this part of the city having increased so in value that it is impossible for the concern to expand in this location.

To Increase Bearing Output—The Suspension Roller Bearings Co., of Sandusky, Ohio, has increased its capital stock from \$250,000 to \$350,000 for the purpose of increasing the output of the plant.

Establish an Eastern Branch—The Carl Lipman Mfg. Co., of Beloit, Wis., manufacturing various devices and appliances for garages and motor cars, has established an eastern branch in New York and will increase its production.

U. S. Tire Output Large—The April output of the Hartford plant of the United States Tire Co. comprised 70,000 bicycle, 35,000 motor car and 150 tons of vehicle tires. The new power house, 108 by 68 feet, is nearly completed. The factory now employs about 1,700 hands.

Ohio Electric to Enlarge—The Ohio Electric Automobile Co., of Toledo, is planning an addition to its plant which will practically double its capacity and employ 200 additional men. The new building will adjoin the present four-story brick plant, of the same height and dimensions and cost \$100,000.

Overland Plans an Extension—The Willys-Overland Co. is planning for a further extension of its Toledo plant. To make this possible the city council at its last meeting vacated a number of streets and alleys, most of which were paper thoroughfares only. The exact plans have not yet been made public, but large extensions are contemplated.

Spring Company Leases Factory—The Buffalo Automobile Spring Co., recently incorporated, has leased for manufacturing purposes the two-story brick factory building at 146 Virginia street. The men financially interested in the new Buffalo company are Toledoans, being Earl Plantz, president; Harvey E. Spangler, vice-president, and W. Edward Slater, secretary-treasurer.

Motsinger Is Sole Owner—Ben G. Gilbough and H. B. Earl have sold their stock in the Motsinger Device and Mfg. Co. of La Fayette, Ind., to Homer N. Motsinger, the latter now being sole owner of the company. Mr. Gilbough has tendered his resignation as secretary of the company and will spend the summer traveling for his health and will then take charge of the eastern territory for

the Motsinger company. He will be succeeded by N. H. Motsinger, Jr., brother of the president of the company, now Chicago manager for Wheeler & Schebler.

Promise June Deliveries—Officers of the Tarrytown Motor Car Co., Inc., manufacturers of the MotoKart, a light parcel-carrying commercial car, announce that deliveries will begin about June 15.

New Truck for St. Louis—A new 1,000-pound truck and a light farm tractor will soon be manufactured in St. Louis by the Admiral Motor Co., which is in the process of organization.

To Back Car Makers—At a meeting of the business men of Jefferson, O., recently a resolution was adopted providing that as soon as the Pressed Steel Motor Car Co. would bring a completed car to Jefferson, and place \$25,000 in a local bank, the citizens of that city would raise \$25,000, buy a site and erect the initial building for the establishment of the concern.

Receiver for C. D. Firestone—Frank R. Vance has been named receiver for the personal property of Clinton D. Firestone, former president of the Columbus Buggy Co., Columbus, O., which was sold recently at receivers' sale. The application for the receiver for the personal assets of Mr. Firestone was made by the Martin C. Johnson Co. of Chicago, which alleged that two transfers of real estate from Mr. Firestone to his wife were illegal. The court set the transfers aside.

Buy Site Near Speedway—The Swartz Electric Co., through its president, Ira T. Swartz, has bought a factory building and 1 acre of ground opposite the Indianapolis motor speedway, the consideration being \$10,000. Arrangements are to be completed immediately to erect two additional fireproof factory buildings and these and the building now on the site will be occupied by the company, which manufactures electric lighting equipment.

Another Car for Ohio—The organization of the Allen Motor Car Co. with an authorized capital of \$500,000, has been completed and the announcement is made that a car will soon be manufactured in Fostoria, O., and placed on the market which will sell for about \$1350. The organizers of the concern are E. W. Allen, W. O. Allen, J. E. Wright, M. A. Thomas, O. P. Bernhart, George E. Schroth, Grayton Baker, R. J. Christy and H. C. DeRan.

Brief Business Announcements

Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Make	Town	Agent	Make
Boston, Mass.	Knox Auto Co.	Knox	Logan, O.	Charles R. Lutz	Ford
Carrollton, O.	Tope & Beamer	Studebaker	Toronto, Ont.	Pope-Hartford Motor Co.	Baker
Columbus, O.	Ohio Auto Sales Co.	Regal	Philadelphia, Pa.	Fanning-Paxon Maxwell Co.	Maxwell
Columbus, O.	Johnston Sales Co.	Herrshoff	Plymouth, Ind.	Fred H. Kuhn	Oakland
Creston, Ia.	Henry M. Brown	Franklin	Seattle, Wash.	Clayton Gibson	Chandler
Fredericton, N. B.	Smith Foundry Co., Ltd.				

COMMERCIAL CARS

Albion, N. Y.	Albion Garage	Menominee	New York	George W. Miller	Menominee
Baltimore, Md.	Gilbert A. Wehr	Dart	Niagara Falls, N. Y.	Peter Lammerts	Menominee
Beloit, Wis.	Beloit Auto Sales Agency	Menominee	Olean, N. Y.	F. W. Forness, Jr.	Menominee
Binghamton, N. Y.	Binghamton Motor Car Co.	Menominee	Omaha, Neb.	Lining Implement Co.	Menominee
Boston, Mass.	W. F. Magill	Dart	Oshkosh, Wis.	F. S. Hoaglin Auto Co.	Menominee
Buffalo, N. Y.	L. G. Schoepflin Co.	Menominee	Portland, Ore.	Gerlinger Motor Car Co.	Menominee
Butler, Pa.	A. C. Hileman	Dart	Rochester, N. Y.	W. E. Davidson	Menominee
Calgary, Alta.	Loughheed & Webster	Stewart	Poughkeepsie, N. Y.	John Van Benschoten	Stewart
Chicago	Wadford Auto Co.	Menominee	Providence, R. I.	Edgewood Garage	Stewart
Danville, Ill.	Robert Holmes & Bros.	Menominee	Quincy, Ill.	Quincy Garage	Dart
Easton, Md.	E. P. Corkran	Menominee	Reno, Nev.	J. C. Durham	Dart
Elizabethtown, Pa.	E. C. Cobble	Dart	Salt Lake City, Utah	Cheesman Automobile Co.	Menominee
Fond du Lac, Wis.	E. W. Clark Motor Co.	Menominee	Salt Lake City, Utah	Inter-Mountain Transportation Co.	Dart
Fort Plain, N. Y.	H. B. Gray Co.	Stewart	Saskatoon, Sask.	George H. Hack	Stewart
Ft. Worth, Tex.	Mayer & Vickland	Dart	Seattle, Wash.	F. H. Bardshar	Menominee
Green Bay, Wis.	West Side Garage	Menominee	Shawano, Wis.	Frogner Auto Co.	Menominee
Harrisburg, Pa.	Ennisgar Garage	Dart	Sheboygan, Wis.	Konaak & Zehms	Menominee
Herkimer, N. Y.	G. E. Clerk	Stewart	Seattle, Wash.	Pacific Car Co.	Menominee
Houghton, Mich.	Northern Garage and Supply Co.	Menominee	Spokane, Wash.	Abbott-Detroit Garage Co.	Menominee
Hudson, N. Y.	Wm. Petry Garage	Stewart	Stevens Point, Wis.	Gullikson-Holte Co.	Menominee
Jacksonville, Fla.	Gallotin Motor Car Co.	Menominee	Ft. Dodge, Ia.	Tremaine & Rankin	Dart
Jamestown, N. Y.	Slawson & Lansbury	Menominee	St. Louis, Mo.	American Welding and Auto Repair Co.	Menominee
Johnstown, N. Y.	Johnstown Motor Car Co.	Stewart	Sturgeon Bay, Wis.	Frank I. Pleck	Menominee
Kankakee, Ill.	George A. Fortin	Menominee	Superior, Wis.	Ross Motor Car Co.	Menominee
Kingston, N. Y.	Van's Garage	Stewart	Syracuse, N. Y.	A. J. Jackson	Standard
Leavenworth, Kans.	W. G. Hesse & Sons Mfg. Co.	Menominee	Syracuse, N. Y.	Syracuse Garage	Stewart
Leopold, N. Y.	B. N. Lafer	Menominee	Syracuse, N. Y.	J. L. Youmans	Menominee
Logansport, Ind.	H. C. Metzger	Menominee	Tama, Ia.	Harlan & Cory	Dart
Los Angeles, Cal.	F. M. Sinsabaugh	Menominee	Toronto, Ont.	Masco Co.	Standard
Madison, Wis.	Frank Statz	Menominee	Troy, N. Y.	Payne Automobile Co.	Stewart
Manistique, Mich.	W. J. Bebeau	Dart	Vancouver, B. C.	H. J. Tucker	Menominee
Manitowoc, Wis.	Central Iron Works	Menominee	Victoria, B. C.	John G. Watson & Sons	Menominee
Marquette, Mich.	Superior Garage	Menominee	Walla Walla, Wash.	Apperson Motor Car Co.	Menominee
Milwaukee, Wis.	Deuster & Teller	Menominee	Watertown, N. Y.	Watertown Auto and Supply Co.	Menominee
Mishawaka, Ind.	George F. Eberhart	Menominee	West Chester, Pa.	Chester County Garage	Menominee
Newburgh, N. Y.	Van Motor Co.	Stewart	Wilmington, Del.	Hansen Automobile Co.	Menominee
Newport, R. I.	George A. Smith	Dart	Winona, Minn.	Winona Motor Co.	Menominee
Newburg, N. Y.	Chas. H. Bellinger	Dart			

PHILADELPHIA, Pa.—The Petry-Cassidy Co., 1421-1433 Vine street, has been appointed sales representatives of the Hood tire.

Tacoma, Wash.—The Garfield Auto Co. has been formed by A. P. Johnson, G. H. Arland, C. T. Arland and S. H. Shireman.

San Francisco, Cal.—W. D. Wallace, formerly of Seattle, has recently been appointed sales manager of the Franklin Automobile Co. in San Francisco.

Milwaukee, Wis.—Allen H. Small, of Milwaukee, has become Wisconsin field representative for the Marion Motor Car Co., with headquarters in the Edgar F. Sanger Co. garage, Milwaukee representative of the Marion and Stearns.

Port Huron, Mich.—H. E. Dove, who has been acting in the capacity of local branch manager for the Buick Motor Co., has become associated with the Havers Motor Car Co., of Port Huron, in the capacity of Pacific coast manager for that company. He will make his headquarters at San Francisco.

Fond du Lac, Wis.—Edward M. McGowan is contemplating the manufacture of an automatic fender or bumper for motor cars upon which he has just been granted patent rights. The fender is in the form of a shield or scoop which is released by spring devices and catches any object in the path of the car.

Milwaukee, Wis.—It is reported on good authority that August A. Jonas, president of the Jonas Automobile Co., Cadillac agent at Milwaukee for 10 years or more, is negotiating for the purchase of the garage and business of the Kopmeier Motor Car Co. at 375-389 Summit avenue, one of the largest in the middle west. The Kopmeier interests are said to be desirous of retiring from the

motor car business in order to be able to devote their entire time to their extensive ice and cartage business.

Portland, Wash.—F. B. Norman, formerly connected with the Ford branch in Seattle, has been placed in charge of the Portland Ford agency.

Hartford, Conn.—The R. D. & C. O. Britton Co. has been appointed local distributor of the Rauch & Lang electric in Hartford, Springfield, Meriden and Middletown. The concern now handles the Federal truck and Oakland and Maxwell pleasure cars.

Baraboo, Wis.—L. P. Helm, who has conducted a garage and machine shop at Baraboo for many years, has engaged in the building of motor trucks on a small scale. The first model, to be known as the Wisconsin, has just been completed. It is of the 2-ton type, propelled by a motor rated at 35 horse power. Mr. Helm is preparing to build about 100 cars annually.

Boston, Mass.—The Britton-Stevens Motors Corp. has just been formed by William H. Britton, George D. Stevens and Charles F. Pinkham, all of whom were formerly connected with the Mack Motor Co. in Boston. The new company is to handle three lines of trucks—the Maccarr, Smith-Milwaukee and Landsen. Temporary quarters have been taken at 323 Columbus avenue.

Milwaukee, Wis.—The Franklin Auto and Supply Co., Fourth and Prairie streets, state agent for the Franklin car and a jobber in accessories, has decided to retire from the field. The company was organized several years ago by Henry Danischewsky, a structural contractor of Milwaukee; August G. Mueller and H. B. Webb. Mr. Danischewsky retires because his other interests demand

his entire attention. It is expected that a new company will be organized at once to assume the Franklin agency.

Philadelphia, Pa.—The Fanning-Paxon-Maxwell Co. has been organized to distribute the Maxwell car in this territory with temporary headquarters at 308 Abbott building.

Columbus, Ohio—The Ohio Rubber and Tire Co. is the name of a new concern recently opened at 183 East Gay street to conduct a vulcanizing shop and tire agency.

Ladysmith, Wis.—W. D. and Logan Smiley have established a garage and repair shop in the former Lindoo implement warehouse and will take on agencies after organizing the business.

Racine, Wis.—R. R. Birdsell is erecting a public garage building at 923-925 Washington avenue. The structure will be two stories high, 38 by 140 feet in size, of reinforced concrete, strictly fireproof.

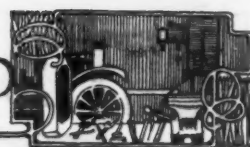
New Haven, Conn.—The Bradford-DeBussy Co. has leased the garage formerly occupied by the Alling Motor Co. at 401 Crown street. Business will be conducted under the name of the Bradford garage.

Seattle, Wash.—The Lozier Motor Co. will put a factory branch in Seattle. The new factory branch manager will be named in the next few weeks. The Lozier branch will have headquarters in the Motor building.

East Liverpool, Ohio—The Columbiana Land Co. of Columbiana has purchased a tract of land in that city on which it proposes to erect a rubber plant. A. E. Albright, of Carrollton is president of the company and D. A. McIntosh of East Palestine vice-president.



The Motor Car Repair Shop



Tool to Facilitate Timing

IN Fig. 1 is shown a tool such as is in continual use in many repairshops to facilitate the timing of motor valves and ignition apparatus. It is a very simple device and can be easily made from material generally to be found in the stockroom or scrap heap of a repairshop. It comprises only a rod R and a nipple P, having a thread similar to that of an ordinary petcock.

For certain types or makes of motors, which have no mark on the flywheel, a timing device of this kind is most essential, and on such motors a petcock or spark plug hole usually is conveniently arranged directly above the piston so that the device may be used as illustrated at the left of Fig. 1.

The point of the device is designed to rest on the head of a piston, whilst the nipple is secured in a petcock or spark plug hole and acts as a guide and registers. The rod is graduated as indicated to show the exact relative position of the piston in the cylinder.

Regarding Copper Tubing

As copper tubing is extensively used on the motor car for the purpose of conveying fuel and lubricants from supply tanks to the motor, a few hints on the treatment of copper tubing in the repairshop might be of interest.

First of all the repairman should remember that copper tubing may be very readily bent without damage when properly annealed; and is even claimed that a copper pipe line is much less easily damaged or broken from vibration if thoroughly annealed before being applied to the car. To anneal a copper tube means to render it soft and easy to bend by means of heat treatment. The process is very simple and consists in merely heating the tubing uniformly to a cherry red, and then immersing it suddenly in cool water.

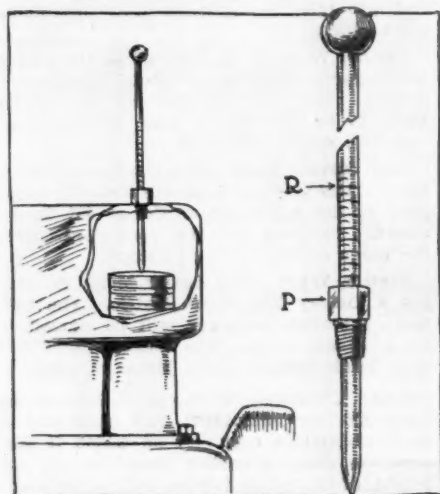


FIG. 1—USE OF TOOL FOR TIMING

A certain motor concern anneals all of the copper tubing fitted to its cars. The tubing comes in great long pieces; and it is annealed in a small gas furnace, as shown in Fig. 3, where it is heated to a temperature that will just bring the tubing to a bright cherry red color, and not burn it. The long tubes are then stuck into this furnace little by little, a foot at a time, until it is all in and heated to the same temperature, then it is removed and plunged into water to complete the process. A suitably sized tub or pail of water should be arranged conveniently near the furnace before the heating operation begins. Thus there will be no hurrying about when the tubing is ready to be quenched.

To straighten the tubing again after the annealing is a very simple operation, it being required to straighten it as nearly as possible with the hands, and then squeeze it lightly a few inches at a time

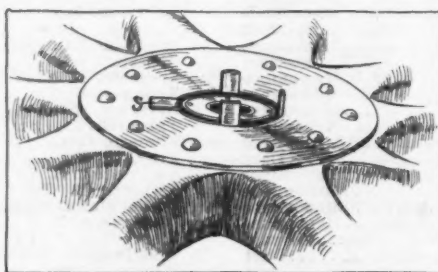


FIG. 2—METHOD OF FITTING WHEEL BEARING

between the jaws of a vise. Of course, one can only straighten a little at a time because of the limited width of the vise jaws; but with a little practice it goes pretty quickly and the method on the whole is very effective.

Hint on Fitting Annular Bearings

It has been found that after an annular ball bearing has been replaced in the outer portion of a wheel hub a few times, the hub is apt to have been stretched so that when subsequent annular bearings are to be fitted the recess in the hub is too large. It is very necessary that a front wheel hub bearing fit snugly in place, and to make them fit so, the method illustrated in Fig. 2 is employed by a large taxicab concern.

The bearing in this case is much too small to fit snugly without the presence of the four flat strips of steel employed. In fitting the bearing into the wheel with these strips to secure it, the wheel is laid on its side and one or more strips are arranged at four points 90 degrees apart around the circumference of the bearing recess. The same number of strips is employed at each point so that the wheel may be properly centered. The strips are cut a little longer than is necessary so

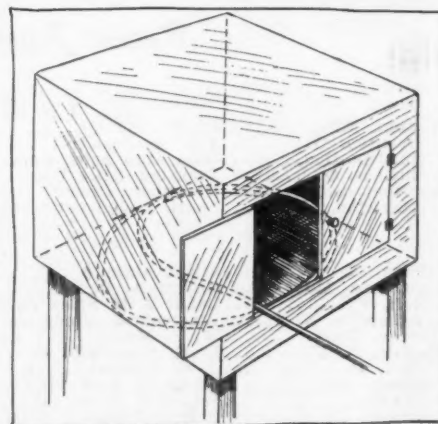


FIG. 3—HEATING TUBING IN GAS FURNACE

that they reach within about $\frac{1}{4}$ of an inch of the bottom of the bearing recess, and still leave about $\frac{1}{2}$ to $\frac{3}{4}$ inch to be bent or hooked over the edge of the hub recess as indicated at S in the illustration. This is to hold the strips in place while the bearing is being fitted. When the bearing has been forced into place between the strips, the ends which were hooked over the edge of the hub may be cut off if necessary with a chisel, or by bending them over and back a few times until they break off, then the rough portions remaining should be filed off smooth and flush. If these extensions can be simply bent in and retained, however, it might facilitate the next refitting operation considerably.

It must be borne in mind that unless the annular bearing in a wheel is properly secured, movement will take place between the bearing and its recess, that will be detrimental to the life thereof.

Cleaning Radiators

A great many motorists are at a loss to know just what is the best method to employ for cleaning radiators. According to Harrison Boyce, the inventor of the Motometer and an authority on motor and motor heat, one method is to use a pickling solution made up of sulphuric acid, or vitriol, as it is commercially known, the proportions used being about the same. A 10 per cent solution will be found to be strong enough for all purposes. Mix with cold water by pouring the acid into the water slowly. It is not wise to pour the water into the acid for then there is a possibility of the acid splashing in one's face.

The solution should be permitted to cool before it is used. In order to note how the sulphuric acid affects the brass or copper of the radiator draw off some of the solution from time to time, refilling with fresh solution. When it begins to run clear the work is completed and the radiator should be flushed thoroughly.

STROMBERG

Carburetors

The Stromberg is the most flexible carburetor made—and this with absolutely no sacrifice of economy.

In the feature of flexibility, the Stromberg is practically a combination of two carburetors—a low speed instrument and one for every other speed from low through high. It is as efficient, reliable and economical for low speed driving as for racing.

This wide range of service in the Stromberg is accomplished by the use of two springs. The ordinary carburetor has but one spring for doing the necessary work; a construction which has been proved unwieldy and impractical.

The Stromberg low speed spring, which operates the auxiliary air valve from beneath, is delicate in tension and instantly responsive to the slightest motor suction. When

the car is running on high gear, at low speed, the carburetor takes more air and less gas than is possible in any other carburetor. The result is perfectly proportioned low speed mixture, adopted solely to low speed work,—not a high speed mixture "bullied" into service as a makeshift.

The high speed spring operates the auxiliary air valve from above. It is independent of the low speed spring and operates only on high or intermediate speed. Its action provides the richer mixture necessary for greater speed, and with the same rigid economy provided by the low speed spring.

The action of both low and high speed springs being entirely automatic, it is mechan-

ically impossible to waste gasoline. The fact that both springs are regulated and set at our factory is positive assurance to you that every drop of your gasoline is giving its full quota of driving power.

The spring arrangement is only one of the highly important Stromberg features you should know about, in order that you may choose your car equipment intelligently. Our "Reason Why Talks" explain this and every other point of Stromberg superiority clearly and fully. You cannot afford to be without them. They will be sent, free and postpaid, on receipt of your name and address. Write today.

Stromberg Motor Devices Company
54 East 25th St., Chicago, Illinois

New York

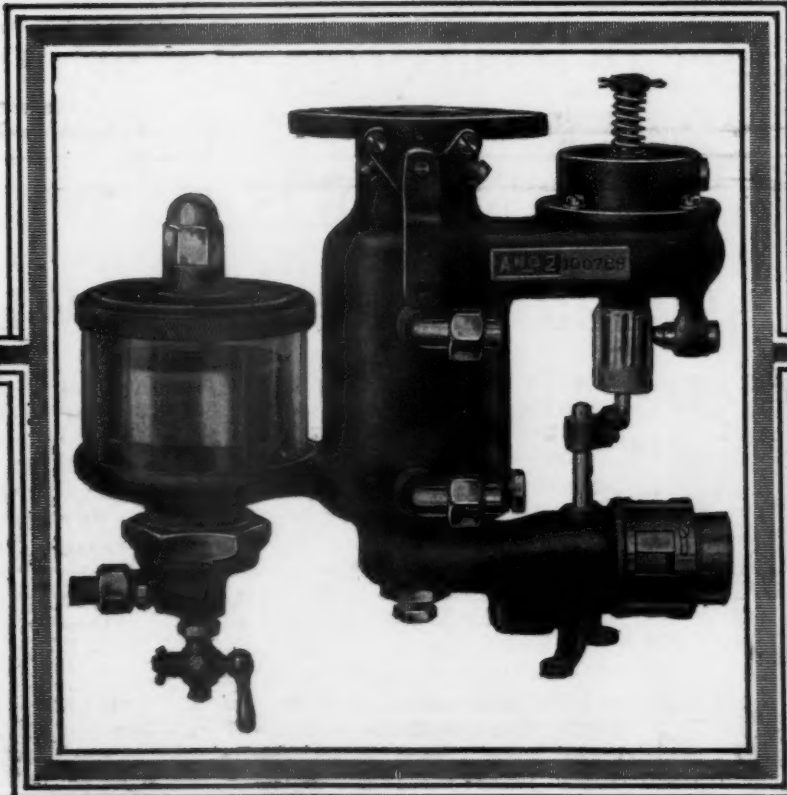
Boston

Branches
 Detroit

Indianapolis

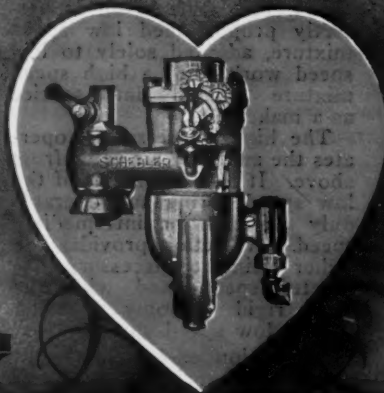
Minneapolis

Pacific Coast Distributors: Chanler and Lyon Co., Los Angeles, Portland, Fresno, Spokane, San Francisco, Seattle
 Canadian Distributors: Russell Motor Car Company, Toronto, Montreal, Hamilton, Winnipeg, Calgary, Vancouver



SCHEBLER

*The Aristocrat
of Carburetors*



"The Heart of the Automobile"

WHEELER & SCHEBLER

"Pioneers in Perfection" of Carburetion

MANUFACTURERS
INDIANAPOLIS U.S.A.

THE SCHEBLER IS THE ACKNOWLEDGED
STANDARD CARBURETOR OF THE WORLD

Branches

NEW YORK
BOSTON
PHILADELPHIA
ATLANTA
MINNEAPOLIS
KANSAS CITY
CHICAGO

DETROIT
DENVER
SAN FRANCISCO
LOS ANGELES
SEATTLE
MONTREAL CAN.
SIDNEY AUSTRALIA

Service Department

Distributors

Every city and town in
the United States and
Canada • Europe and
Australia

"Sounding the ultimate death-knell of the bulb-horn—

This is a news-item quoted verbatim from the Portland (Ore.) Journal, March 2nd, 1913

directors of the Portland (Ore.) Automobile Club passed a resolution Friday urging members and other motorists to confine themselves to the use of adequate warning signals.

"Following the lead of Chicago and other metropolitan cities, the directors considered the advisability of asking their members in an indirect way to do all in their power to do away with the bulb-horn.

"It is generally conceded that electric warning signals are the only real, adequate means of warning pedestrians of immediate danger. Confusion often results from the feeble tooting of the weak 'reed.' "

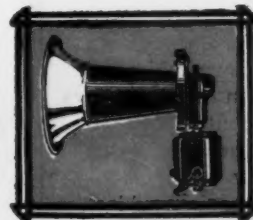


KLAXONET

Lovell-McConnell Mfg Company Newark, N.J., U.S.A.

KLAXON

"The Public Safety Signal"

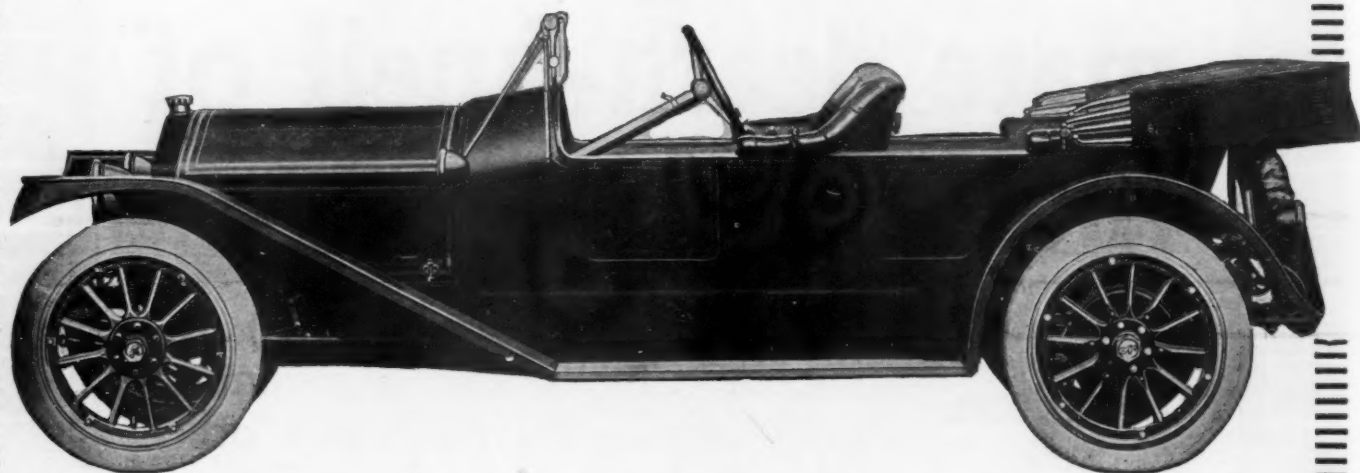


KLAXON

Stock Champion

National

International Champion

"Once a National owner, always a National owner"

Which do you prefer— specifications or performance?

Here is how one dealer decided it.

To him there was a similarity in the catalog specifications of several cars—the dimensions and general appearance were somewhat alike—so he said: "Where does the difference come in?"

He found it in the *National's unseen specifications*.

National's unseen specifications

Comfort
Confidence under all circumstances
Freedom from worry
Luxury
Enjoyment
Satisfaction
Safety
Service
Pride of ownership
Reputation of the builders
Ease of control
Noiselessness
Reliability
Lack of repair troubles
Heritage of success
Sureness
Convenience
Masterly performance

Judge a motor car by its performance

Today the man in the market for a car does not want to buy specifications — what he wants is *results*—and the *National* is willing to stand or fall on its actual performances.

In the *National* every part operates in perfect harmony for maximum pleasure and service.

The mechanical features work so smoothly, so satisfactorily, that the owner's attention is never attracted to them.

While the *National's* published list of specifications is superior, it's the *unseen specifications* that are most important to the dealer and user.

The *National* dealer is assured of a successful business—the user of satisfaction always.

Write us for more information—it will be a pleasure to give it.

Five models, \$2750 to \$3400

National Motor Vehicle Company
Indianapolis, Indiana

Automobile Manufacturers Who Have Contracted For



**Storage
Batteries**

Exclusively For Starting or Lighting or Both

Abbott Motor Co.....	Detroit, Mich.	McLaughlin Motor Car Co.....	Oshawa, Ont.
Allen Motor Car Co.....	Fostoria, Ohio	Marathon Motor Co.....	Nashville, Tenn.
Alpena Motor Car Co.....	Alpena, Mich.	Marion Motor Car Co.....	Indianapolis, Ind.
American La France Fire Engine Co.....	Elmira, N. Y.	Maritime Motor Car Co., Ltd.....	St. John, N. B.
American Locomotive Co.....	Providence, R. I.	Martindale & Millikan.....	Franklin, Ind.
American Motors Co.....	Indianapolis, Ind.	Maxwell Motor Car Co.....	Detroit, Mich.
Ames Motor Car Co.....	Owensboro, Ky.	Mercer Automobile Co.....	Trenton, N. J.
Apperson Bros. Automobile Co.....	Kokomo, Ind.	Metzger Motor Car Co.....	Detroit, Mich.
O. Armleder Company.....	Cincinnati, Ohio	Michigan Buggy Co.....	Kalamazoo, Mich.
Auburn Automobile Co.....	Auburn, Ind.	Midland Motor Car Co.....	Moline, Ill.
Austin Automobile Co.....	Grand Rapids, Mich.	Moline Automobile Co.....	East Moline, Ill.
The Avery Company.....	Peoria, Ill.	Moon Motor Car Co.....	St. Louis, Mo.
Bartholomew Company.....	Peoria, Ill.	Motor Car Manufacturing Co.....	Indianapolis, Ind.
Buckeye Manufacturing Co.....	Anderson, Ind.	Nance Motor Car Co.....	Philadelphia, Pa.
Canadian Standard Auto & Tract. Co.....	Fort Wayne, Ind.	National Motor Vehicle Co.....	Indianapolis, Ind.
Cartercar Company.....	Pontiac, Mich.	Nordyke & Marmon Co.....	Indianapolis, Ind.
J. I. Case T. M. Machine Works.....	Racine, Wis.	Norwalk Motor Car Co.....	Martinsburg, W. Va.
Chadwick Engineering Works.....	Pottstown, Pa.	Nova Scotia Carriage Co.....	Kentville, N. S.
Chandler Motor Car Co.....	Cleveland, Ohio	Nyberg Automobile Works.....	Anderson, Ind.
F. Coleman Carriage & Harness Co.....	Illion, N. Y.	Oakland Motor Car Co.....	Pontiac, Mich.
Columbus Buggy Company.....	Columbus, Ohio	Packard Motor Car Co.....	Detroit, Mich.
Commerce Motor Truck Co.....	Detroit, Mich.	Paige-Detroit Motor Car Co.....	Detroit, Mich.
Corbitt Automobile Co.....	Henderson, N. C.	Palmer & Singer Mfg. Co.....	Long Island City, N. Y.
Crane Motor Car Co.....	Bayonne, N. J.	Paterson Wagon Works.....	Flint, Mich.
Crawford Automobile Co.....	Hagerstown, Md.	Peerless Motor Car Co.....	Cleveland, Ohio
Crescent Motor Company.....	Cincinnati, Ohio	Pilot Motor Car Co.....	Richmond, Ind.
Crow Motor Car Co.....	Elkhart, Ind.	Pope Manufacturing Co.....	Hartford, Conn.
James Cunningham Son & Co.....	Rochester, N. Y.	Premier Motor Car Co.....	Indianapolis, Ind.
Cutting Motor Car Co.....	Jackson, Mich.	Pullman Motor Car Co.....	York, Pa.
Croxton Motor Car Co.....	Washington, Pa.	Regal Motor Car Co.....	Detroit, Mich.
Geo. W. Davis Carriage Co.....	Richmond, Ind.	Reo Motor Car Co.....	Lansing, Mich.
Di Dion Bouton.....	New York City	Reo Motor Car Co. of Canada.....	St. Catharines, Ont.
Enger Motor Car Co.....	Cincinnati, Ohio	Russell Motor Car Co.....	West Toronto, Ont.
Elkhart Carriage & Harness Co.....	Elkhart, Ind.	Sayers & Scovill Co.....	Cincinnati, Ohio
F. I. A. T. Company.....	Poughkeepsie, N. Y.	Schacht Motor Car Co.....	Cincinnati, Ohio
Flanders Motor Co.....	Detroit, Mich.	Seagrave Company.....	Columbus, Ohio
H. H. Franklin Manufacturing Co.....	Syracuse, N. Y.	Selden Motor Car Co.....	Rochester, N. Y.
Gramm-Bernstein Company.....	Lima, Ohio	Simplex Automobile Co.....	New Brunswick, N. J.
Gramm Motor Truck Co.....	Lima, Ohio	A. O. Smith Company.....	Milwaukee, Wis.
Gramm Motor Truck Co.....	Walkerville, Ont.	South Bend Motor Car Works.....	South Bend, Ind.
Great Western Automobile Co.....	Peru, Ind.	Spaulding Manufacturing Co.....	Grinnell, Iowa
Haberer & Company.....	Cincinnati, Ohio	Speedwell Motor Car Co.....	Dayton, Ohio
Havers Motor Car Co.....	Port Huron, Mich.	Stanley Motor Car Co.....	Newton, Mass.
Haynes Automobile Co.....	Kokomo, Ind.	Staver Carriage Co.....	Chicago, Ill.
Henderson Motor Car Co.....	Indianapolis, Ind.	F. B. Stearns Co.....	Cleveland, Ohio
Herreshoff Motor Co.....	Detroit, Mich.	Stegeman Motor Car Co.....	Milwaukee, Wis.
Ideal Motor Car Co.....	Indianapolis, Ind.	Sternberg Manufacturing Co.....	Milwaukee, Wis.
Imperial Automobile Co.....	Jackson, Mich.	Stevens-Duryea Co.....	Chicopee Falls, Mass.
Jackson Motor Car Co.....	Jackson, Mich.	Stoddard-Dayton Co. (Maxwell).....	Dayton, Ohio
Kelly-Springfield Motor Truck Co.....	Springfield, Ohio	Studebaker Corporation.....	Detroit, Mich.
King Motor Car Co.....	Detroit, Mich.	Tudhope Motor Car Co.....	Orillia, Canada
Kline Motor Car Co.....	Richmond, Va.	Vandewater & Company.....	Elizabeth, N. J.
Knox Automobile Co.....	Springfield, Mass.	Vellie Motor Vehicle Co.....	Moline, Ill.
Lenox Motor Car Co.....	Boston, Mass.	Warren Motor Car Co.....	Detroit, Mich.
Lexington Motor Car Co.....	Connersville, Ind.	Wayne Works.....	Richmond, Ind.
Little Motor Car Co.....	Flint, Mich.	Webb Company.....	Allentown, Pa.
Locomobile Co. of America.....	Bridgeport, Conn.	Westcott Motor Car Co.....	Richmond, Ind.
Lozier Motor Car Co.....	Detroit, Mich.	White Company.....	Cleveland, Ohio
Lyons Atlas Co.....	Indianapolis, Ind.	Wichita Falls Motor Co.....	Wichita Falls, Tex.
W. H. McIntyre Co.....	Auburn, Ind.	Winton Motor Car Co.....	Cleveland, Ohio
		Zimmerman Manufacturing Co.....	Auburn, Ind.

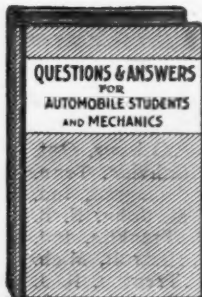
NEED WE SAY MORE?

WILLARD STORAGE BATTERY COMPANY, Cleveland, Ohio

When Writing to Advertisers, Please Mention Motor Age.

ANY BOOK ON THIS PAGE SENT FOR \$1.50 PREPAID

Questions and Answers



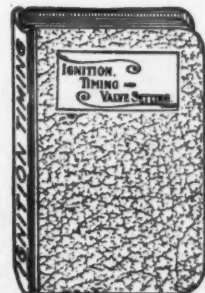
For Automobile Students and Mechanics

By THOMAS H. RUSSELL.
A book of 600 Questions and Answers, adapted for teaching School, the Machinshop or before the Board of Examining Engineers. This is the largest, the latest and most authentic book of its kind upon the market. Prepared especially for Home Study. 150 pages. Bound in flexible covers.—In fact it is a regular text book.

Ignition, Timing and Valve Setting

By THOMAS H. RUSSELL, A.M., M.E.

Pocket size, 225 pages, fully illustrated, Red Flexible Leather Binding, round corners, red edges. A comprehensive illustrated Manual of self-instruction for Automobile Owners, Operators and Repairmen.



CONTENTS

Electrical Ignition for Motor Car Engines—The battery and coil system—The Magneto System—Low tension and high tension methods—Magneto Ignition—General Summary of Ignition—Ignition Faults and Hints—Induction Coils, Timing Ignition—Valves and their Functions—Valve Setting—Useful Hints, etc.

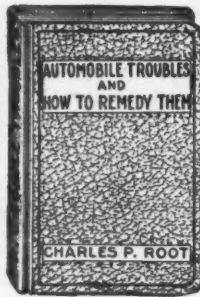
Automobile Troubles and How To Remedy Them

By CHARLES P. ROOT, Former Editor "Motor Age."

Pocket size—5 x 7 inches, 225 pages, illustrated, handsomely bound in red flexible leather, round corners, red edges. The only book of its kind published. It not only tells you how to locate troubles and make repairs, but shows you.

CONTENTS

Back or too early firing (preignition)—Blow-back of gas into carburetor—Popping noises—Buzz in coil (other than contact breaker buzz)—Misfires—Smells—Stoppage of engine—Batteries—Bearings—Brakes—Carburation—Change speed gear—Clutch—Coil—Connecting rod or crank shaft broken—Gear—Governor—Ignition—Lubrication—Misfires—Muffler troubles—Overheating—Piston troubles—Popping in carburetor—Spark plug—Steering—Timing—Tires—Valves—Valve springs, and numerous other troubles.



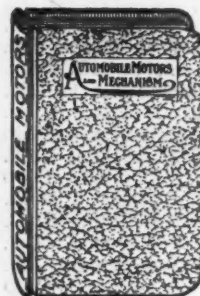
Automobile Motors and Mechanism

By Thomas H. Russell, A.M., M.E.

Pocket size, 265 pages, red flexible leather, round corners, red edges, fully illustrated.

CONTENTS

The Internal Combustion Engine—Production of the fuel mixture—Function of the carburetor—The cycle of operations—Cylinders, piston and rings—Shaft and bearings—Ignition apparatus—Single and multi-cylinder engines—The two-cycle engine—Silencing the exhaust—Detailed description of construction—Governors and governors—The centrifugal governors—Carburetors—The float-feed principle—Various types of modern construction—Flooding the carburetor—Carburetor troubles and adjustments, etc.—Transmission Mechanism—Home-made automobile for \$25—Three-wheeled motor car, etc., etc.

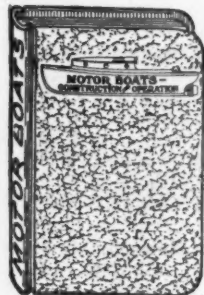


Motor Boats: Construction and Operation

By THOMAS H. RUSSELL, A.M., M.E.
Pocket size, 300 pages, fully illustrated, flexible leather, round corners, red edges. A manual for motor boat and yacht owners and all users of marine gasoline engines.

CONTENTS

Principles of marine gasoline Engines—The two cycle and four cycle engine—The power boat in business, recreation and racing—Battery and magneto ignition—Use of wet batteries and dry cells—High tension and low tension current—The storage battery and dynamo—Actual working of marine gasoline engines—Carburation and carburetors—Valves and connections—Latest improved types—Motor troubles, their causes—Lubrication and lubricators for marine engines—Offset cylinder construction—Reverse gears—Two and three bladed wheels—Motor boat hull construction, etc., etc.



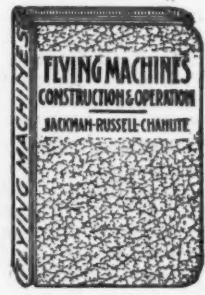
Flying Machines CONSTRUCTION AND OPERATION

By W. J. JACKMAN, M. E., and THOMAS H. RUSSELL, A.M., M.E.
With Introductory Chapter By OCTAVE CHANUTE, C.E.
President Aero Club of Illinois.

Pocket Size, 250 pages. Fully illustrated, Leather and Cloth, Round Corners, Red Edges. A "Show How" Book for Those Who Wish to Build and Operate Flying Machines.

CONTENTS

Evolution of Two-Surface Machine; Chanute—Difference Between Airships and Flying Machines—Mechanical Birds—Machine Limitations—How Bird Action is Obtained—Kind and Quantity of Material Required—Motors, Installation and Operation—Principles of a Successful Flying Machine—Lifting Power Required—Construction Details of Monoplanes, Triplanes and Multiplanes, etc., etc.



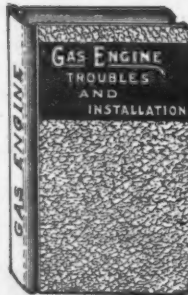
Gas Engine Troubles and Installation

By J. B. RATHBUN, B.S.C.E.

Author of "Commercial Vehicles for All Purposes," etc.

440 Pages, 150 Detailed Line Drawings and Illustrations.

A book that shows you HOW TO INSTALL—HOW TO OPERATE—HOW TO MAKE IMMEDIATE REPAIRS and HOW TO KEEP A GASOLINE ENGINE RUNNING. The language is simple—the illustrations are clear. The book is authentic—complete—up-to-the-minute, written by an expert who is employed daily as a Consulting and Demonstrating Engineer and Instructor. Nothing has been omitted—it contains no useless matter—Just the cream of daily experience. Two Folding Trouble Charts.



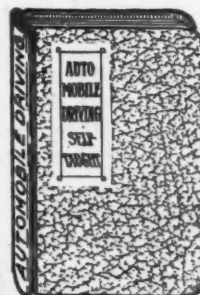
Automobile Driving Self-Taught

By THOMAS H. RUSSELL, A.M., M.E.

An exhaustive treatise on the Management, Care and Operation of Motor Cars. Pocket size, 230 pages, liberally illustrated, handsomely bound in red flexible leather, round corners, red edges.

CONTENTS

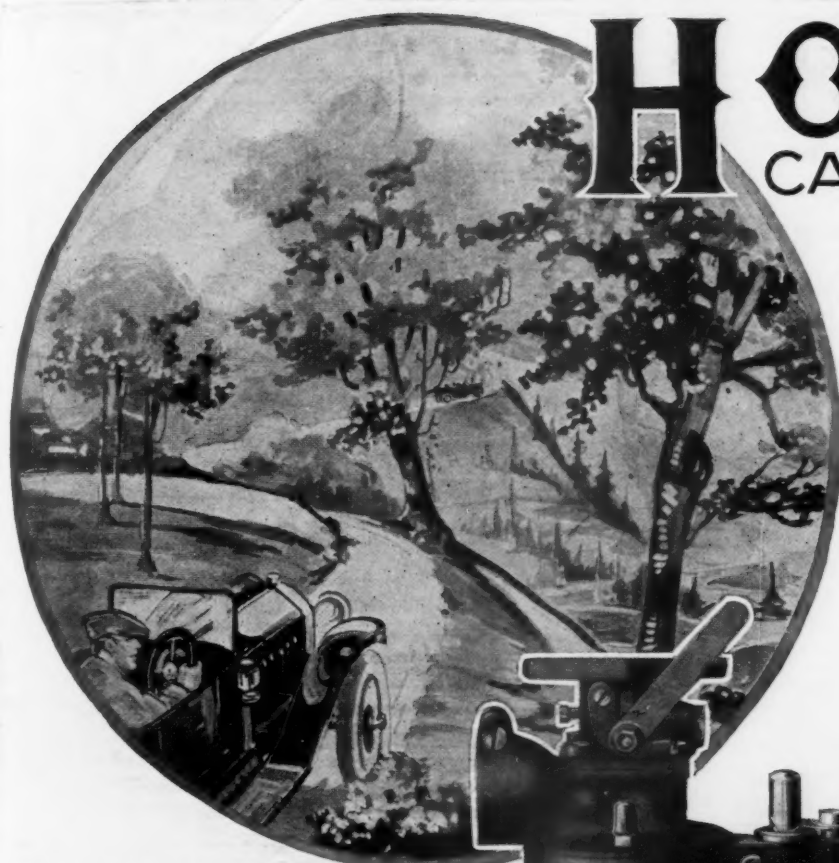
Automobile Driving—Self-tuition in driving—Difficulty in starting—Involuntary stops—Loss of Power—Care and maintenance of motor cars—Care of a car on a tour—Laying up a car—Gasoline—Gasoline hints and tips—Operating mechanism of a modern car—Law of the Road—Don'ts for motor car drivers, and many other points.



BOOK
DEPARTMENT

CLASS JOURNAL COMPANY

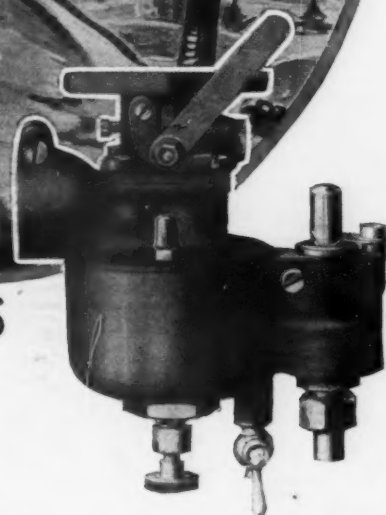
910 S. MICHIGAN AVE.,
CHICAGO, ILL.



HOLLEY

CARBURETOR

NO MOVING PARTS



ONLY ONE ADJUSTMENT

In Mountain Touring

where a frequent change from the sea-level pressure to the rarified atmosphere of the upper mountain heights is a frequent occurrence, the true value of the new self-adjusting, no-moving-parts Holley carburetor will be emphasized.

While other carburetors require frequent adjustment, the construction of the Holley is such that it automatically takes care of varying air pressures, and relieves the driver from the annoyances which springs, delicate valves, balls, cams and other sensitive devices frequently cause.

This is only one of the reasons why we say that the new self-adjusting, no-moving-parts Holley is two years ahead of the rest.

As an evidence of the truth of this statement, over half the gasoline cars manufactured in the United States during 1913 will be equipped with the new self-adjusting Holley carburetor.

HOLLEY BROTHERS CO., 131-141 Rowena St., Detroit

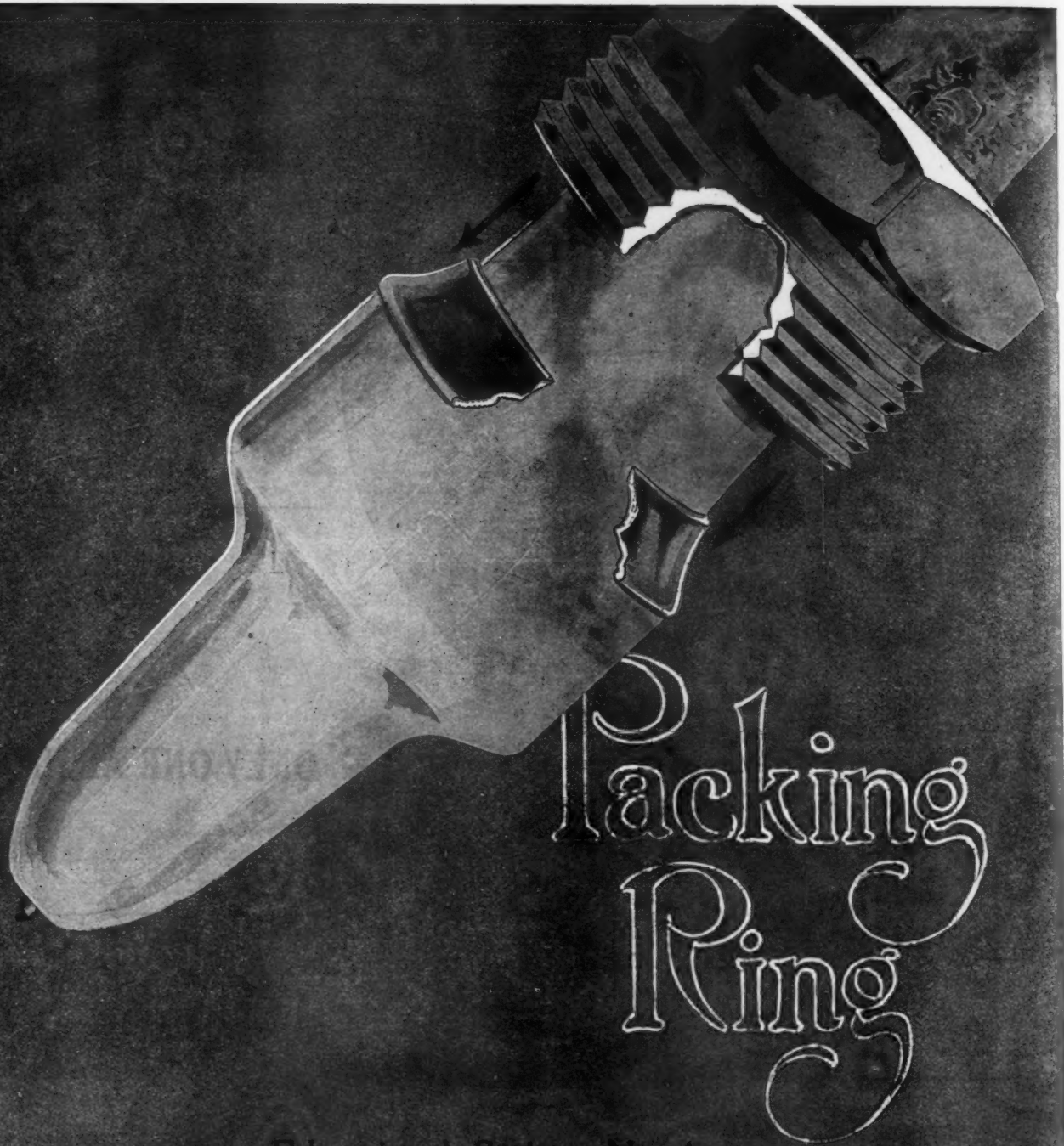
AUTOMOBILE SUPPLY CO. 1335 Michigan Boulevard, Chicago, Ill. OMAHA RUBBER CO. Omaha, Neb.
FOREIGN BRANCH: Holley Bros. Co., Coventry, England

Holley Carburetors are carried in stock at the following addresses: CHAS. E. MILLER, Home Office: 97-103 Reade St. and 121 Chambers St., New York.

BRANCHES:

New York City.....924 Eighth Ave.	Hartford, Conn.....274 Trumbull St.	Detroit, Mich. ....227-229 Jefferson Ave.
Between 54th and 55th Sts.	Atlanta, Ga.....66 Edgewood Ave.	Cleveland, Ohio.....1829 Euclid Ave.
New York City.....2782 Broadway	Brooklyn, N. Y.....1421 Bedford Ave.	Philadelphia, Pa.....318 North Broad St.
Between 107th and 108th Sts.	Buffalo, N. Y.....824 Main St.	New Orleans, La.....601-603 Baronne St.
Springfield, Mass.....Bridge and Dwight Sts.	Albany, N. Y.....135 Central Ave.	Newark, N. J.....274 Halsey St.
	Boston, Mass.....202-204 Columbus Ave.	

When Writing to Advertisers, Please Mention Motor Age.



Educational Series—No. 4

The function of the soft brass Packing Ring is to effect an even distribution of the pressure on the porcelain when the bushing is tightened.

RED HEAD porcelains are therefore not subject to breakage as there is no binding.



Emil Grossman Company

London, Eng.

New York - Detroit

Trenton, N. J.

Stewart Speedometer

640 Revolutions vs. 2560 Revolutions

WEAR and tear gauges the efficiency of everything mechanical; deterioration and inaccuracy begin with wear. The less the friction the greater the service, the less the wear the greater the life. And in no other instrument in the world, unless it be the watch, does this rule hold more completely true than in the speedometer.

The Magnetic Type

In a magnetic speedometer the flexible shaft to the car wheel is attached by a slot to the lower end of a funnel-shaped magnet. An aluminum cup upon whose sides is the speed-dial, sets over this magnet, pivoted in the center by means of a steel pivot resting on genuine sapphires. The magnet does not touch the aluminum cup; the latter is rotated to register the speed by the magnetic pull of the magnet. And the weight of this aluminum cup in contrast to the 5-oz. weight in the centrifugal instrument is approximately 100 grains.

This simple, rugged device, devoid of small pins, quick wearing brass, and complicated mechanism of all kinds, at a car speed of 60 miles an hour makes

The Centrifugal Method

In a centrifugal speedometer the flexible shaft to the car wheel rotates a spindle in the instrument's case. On this spindle is pivoted a 5-oz. brass ring. As this ring, through centrifugal force, swings into planes at various angles to the spindle it pushes against an arm on one end of a brass sleeve. This brass sleeve then slides toward it on the spindle—retarded in its action by a spring. On the opposite end of the brass sleeve is a flange. Against this flange there constantly rubs the lower end of a delicate metal pin whose upper end is attached to the small cam which moves the centrifugal speed indicating hand.

This complicated mechanism with its soft yellow brass, small pins, delicate springs and great heavy threshing weight at a car speed of 60 miles an hour makes

Only 640 Revolutions Per Mile

2560 Revolutions Per Mile

Subject to less than one-fourth the wear, tear, strain and friction of the centrifugal instrument; possessing just one fourth the chance of becoming inaccurate; in fact, being four times as frictionless, sturdy, durable and accurate, no car owner can afford to equip with other than a magnetic Stewart Speedometer.

**The Stewart Speedometer Factory, 1931 Diversey Blvd.,
Chicago, U. S. A.**

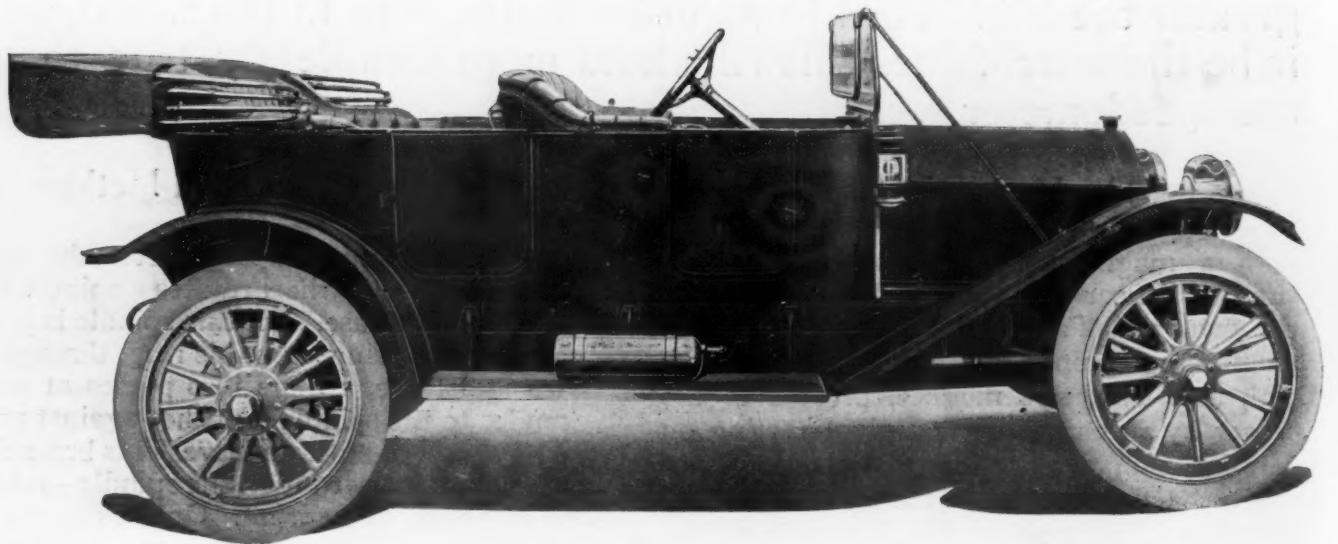
International Service

Real Service Stations In All Important Cities Of The World.

METEOR \$1450

6 Cylinder 40 Horsepower

Completely equipped with Top, Slip Cover, Windshield, Speedometer, Prest-O-Lite Tank, extra Demountable Rim, Electric Signal Horn, Five Lamps, Tools, Jack, etc. Finished in black and nickel.



NO DEPOSITS REQUIRED

THE Meteor sales plan is different. We want dealers who can sell cars, not buy them. As we take no deposits we have nothing to gain unless our dealers can sell cars. The wonderful values we are offering together with our liberal discount and "no deposit" contract makes a combination worth your investigation.

Read the specifications carefully, then wire or write us, stating territory wanted and if you can visit the factory we will hold territory until you arrive. We are making contracts to expire Aug. 1, 1914.

The demand for sixes in 1914 will compel every up-to-date dealer to handle them. It is easier to sell a six than a four at the same price.

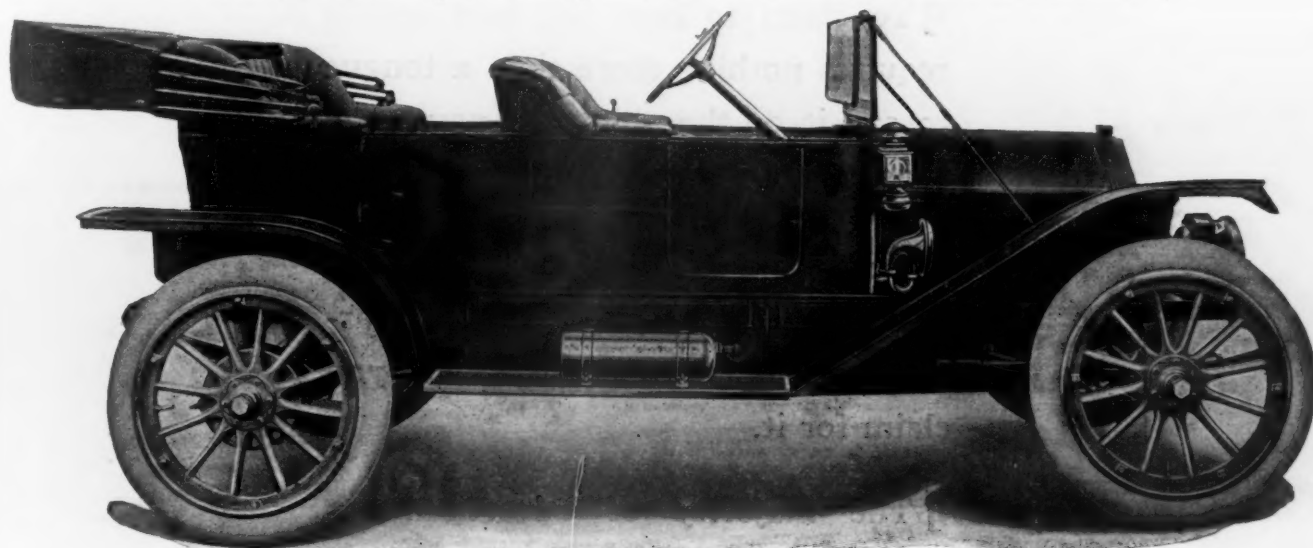
There are no better values on the market than the Meteor Six at \$1450 and the Meteor Four at \$975. Nothing new, nothing novel. Just good motor cars at the right prices. Owing to the wonderful values offered choice territory will undoubtedly be contracted for quickly. If interested we suggest immediate action.

METEOR \$975

4 Cylinder

33 Horsepower

Completely equipped with Top, Slip Cover, Windshield, Speedometer, Prest-O-Lite Tank, extra Demountable Rim, Electric Signal Horn, Five Lamps, Tools, Jack, etc. Finished in black and nickel.



LIBERAL DISCOUNTS

SPECIFICATIONS 6 CYL., 40 H. P.

MOTOR—6-cylinder, $3\frac{3}{4} \times 5$, unit power plant. Warner transmission, multiple disc clutch, Remy magneto, Stromberg carburetor. Self-contained oiling system. Large valves. Very quiet.

REAR AXLE—Full floating. No load on axle shafts. Hyatt roller bearings.

FRONT AXLE—I beam, one-piece drop forging.

STEERING GEAR—Semi-irreversible. Full worm and gear type.

WHEEL BASE—120 inches.

TIRES—35x4 Diamonds—Demountable Rims.

BRAKES—Double internal. Brake drums bolted direct to bossed spokes.

RADIATOR—Square tube, cellular type.

COLOR—Dark blue.

SPECIFICATIONS 4 CYL., 33 H. P.

MOTOR—4 cylinder, $4 \times 4\frac{1}{2}$, cylinders cast en bloc. Three large bearings. Remy magneto. Stromberg carburetor.

REAR AXLE—Full floating. No load on axle shafts. Hyatt roller bearings.

FRONT AXLE—I beam, one-piece, drop forging.

STEERING GEAR—Semi-irreversible. Full worm and gear types.

WHEEL BASE—114 inches.

TIRES—34x3 $\frac{1}{2}$ Diamond—Demountable Rims.

BRAKES—Double internal. Brake drums bolted direct to bossed spokes.

RADIATOR—Square tube, cellular type.

COLOR—Dark blue.

SPECIAL—Torpedo Roadster, fully equipped, on same chassis as Touring Car, with trunk and oval tank.

METEOR MOTOR CAR COMPANY, SHELBYVILLE, INDIANA, U. S. A.

INVADER OILS



¶ To claim to have the best article requires nothing more than a tongue to say it or the ability to pay for a space within which to print it.

¶ To be able to prove your article the best, however, requires that the article itself must possess the merit you claim for it.

¶ The majority of advertisements are so saturated with flat assertions, unsubstantiated statements and meaningless generalities that specific figures or logical arguments are conspicuous only by their absence.

I. O. C. Gear Oil is the only oil ever made especially and exclusively for automobile transmission gears. Write for prices and descriptive booklet.



INVADER

Main Office—80 Broad Street, New York City.

Factories—New York Ph

TERRITORIAL AGENTS—BECK & CORBITT IRON CO., St. Louis, Mo.

BOYER-CAMPBELL CO., Detroit, Mich. BAIL

LEE HARDWARE CO., Salina, Kansas.

INVADER OILS

¶ If the automobilist will get together a collection of different brands of oil and subject them to a comparative analysis for gravity, fire test, carbon deposits and any other characteristics which will indicate their suitability for automobile lubrication, he will discover that Invader Oil is superior to them all by virtue of the physical tests which such an analysis will disclose.



¶ Our statement that Invader Oil is the best means *nothing*. The fact that it can be proved to be the best by such an analysis means *everything*.

0. C. Gear Oil *puls noisy gears to sleep. It reduces friction and absolutely eliminates noise. Write for prices and descriptive booklet.*

RIL CO.



York Philadelphia.

Branches—

BOSTON,
284 Columbus Avenue

PHILADELPHIA,
113 Arch Street

WASHINGTON,
3627 New Hampshire Ave., N. W.

Port, Mich. BAILEY CO., Portland, Me.

MOTOR CAR SUPPLY CO., Chicago, Ill.

ELECTRIC MFG. CO., St. Paul, Minn.

The Atwater Kent Ignition System



You used to drive your car as a "stunt"

Today you drive it for pleasure or business and the less you have to think about "stunts" the better you like the car.

There was a time when changing gears was a stunt. Keeping the sight feed oiler at its work, and the coil tremblers tuned up, and the gas generator in condition to generate were other feats of that Stone Age of motoring.

But if you had to go through all those *coups de legerdemain* today you would sell your car and use the trolley.

But there's one bit of juggling that you still practice—and it takes some skill, too! That is the manipulation of the spark lever.

There's a difference between managing the spark and managing the throttle. The latter is voluntary; you open the throttle to go faster and close it to go

slower. But the former is forced upon you by the peculiarities of the engine. You advance or retard the spark because you must, not because you like to. And many drivers never really get the knack—they advance or retard at the wrong time, and fuel is wasted and bearings strained in consequence.

Hand control of the spark, for ordinary ranges of speed, is really as much a relic of the past as constant regulation of the mixture would be. Just imagine yourself juggling with the carburetor in the way you do with the spark advance! Automatic control is as sure to come in the one case as in the other, and it is already here, for some thousands of motorists who have read the signs of the times and provided themselves with the truly modern kind of ignition service.

We should like to tell you all about the new Atwater Kent System—Type K—not merely because we want to sell it, though naturally that is a factor, but because we know that automatic spark control is the coming thing, and that the Atwater Kent embodiment of that principle gives the ultimate in reliability, efficiency, and convenience. There's not a motorist who installs it but wonders how he ever endured the annoyance so long. And the marvel of it all is the simplicity and low cost of the device!

In another year or two, automatic control will be universally demanded. You will want to be in the forefront. Write your name and address on the margin of this page and we will send you our Booklet "A" and full particulars of the Atwater Kent System without obligation on your part.

ATWATER KENT MFG. WORKS

4934 Stenton Ave., Philadelphia, Pa.

DISTRIBUTORS

New York, E. J. Edmond Co.; Chicago, Motor Car Supply Co., Pellets Magneto Exchange; San Francisco, Chanslor & Lyon Co., Weinstock-Nichols Co.; Los Angeles, E. A. Featherstone; Seattle, Chanslor & Lyon Co.; Portland, Ballou & Wright; Omaha, Omaha Rubber Co., Powell Auto Supply Co.; Dallas and Houston, Fisk Co. of Texas; Wichita, Hockaday Auto Supply Co.; St. Louis, Missouri Auto Specialty Co.; Salina, Lee Hardware Co.; Kansas City, Kansas City Auto Supply Co.; Milwaukee, Julius Andrae & Sons Co.; Detroit, Automobile Equipment Co.; Boston, Motor Supply Shop; Denver, Auto Equipment Co.; Hartford, Post & Lester Co.; Atlanta, Elyea-Austell Co., Chattanooga, Southern Auto & Supply Co.

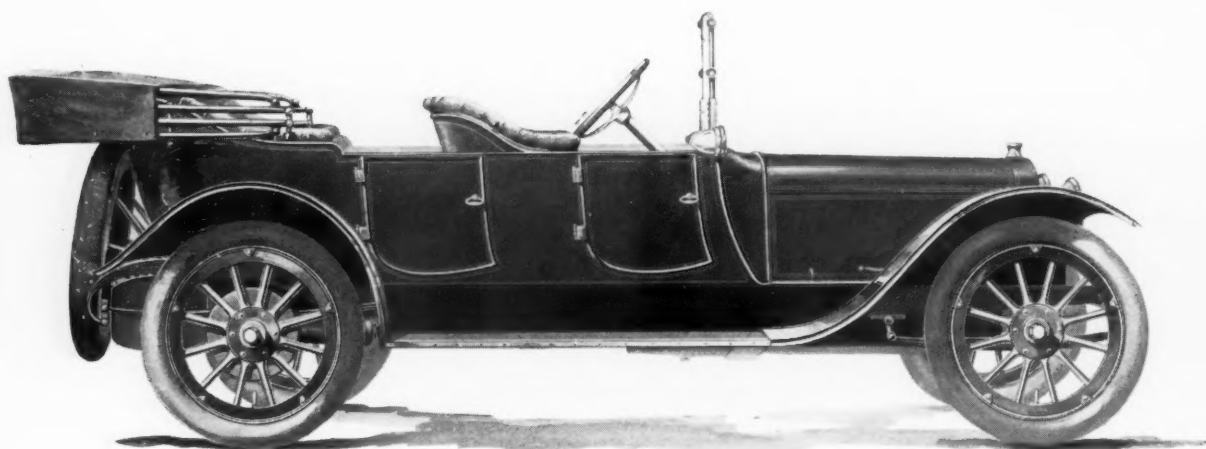
When Writing to Advertisers, Please Mention Motor Age.



THE following three pages give details of the greatest selling proposition in years.

They tell the story of a sensational "six"—a roomy, luxurious motor car—staunch and swift—yet astonishingly light in weight—built by an organization of men who have been building high grade "sixes" for years—selling at a price heretofore thought impossible—\$1785.

Don't Fail to Read It All!



THE CHANDLER LIGHT "SIX" \$1,785

*Left-hand drive—center control—
Westinghouse electric starting and
lighting system—weight under
3,000 pounds, ready for the road.*

THE Chandler Light Six is not an experiment. The men who build it have been building successful high grade "sixes" for years. It has proved its efficiency, its sturdiness under every conceivable test to which a car can be submitted.

Not under \$3,500 will you find a car possessing so many distinctive features, such complete high class equipment. Compare it point for point with any car you please. You must admit that it represents the greatest value ever offered car buyers.

The Men Behind the Car

THE men behind the Chandler Light Six are men of national reputation, who have been building and selling successful high grade "sixes" for years. In the Chandler they are giving the public the benefit of their knowledge.

Here are their names:

F. C. CHANDLER, former vice president, general manager and director, Lozier Motor Co.

C. A. EMISE, former sales manager and director, Lozier Motor Co.

W. S. MEAD, former sales manager and director, Lozier Motor Co.

S. REGAR, former treasurer and director, Lozier Motor Co.

J. V. WHITBECK, former engineer, Lozier Motor Co., Franklin Automobile Co., Olds Motor Works.

C. A. CAREY, former purchasing agent, Lozier Motor Co., assistant purchasing agent, Ford Motor Co.

J. R. HALL, former manager supply, repair and service departments, Lozier Motor Co.

J. V. KRALL, former auditor, Lozier Motor Co.

THE MOTOR—Designed especially by our own engineers. Exceptionally powerful, yet quiet and extremely simple, it sets a new standard in six cylinder motor construction.

STARTING AND LIGHTING SYSTEM—The Westinghouse system with which the Chandler is equipped is the acme of efficiency and simplicity. Cars selling for three times the price will be equipped with it next season.

BODY—The handsome stream line coach body, so popular with leading high grade French and English car builders, imparts a degree of attractiveness and refinement approached by no other car at anywhere near the price of the Chandler.

WEIGHT—Weighing less than 3,000 pounds—2,979 to be exact—*ready for the road*—the Chandler is the lightest, consequently the most economical "six" built. Ask other manufacturers of "sixes"—or even of many "fours"—why they do not advertise the *honest* weight of their cars.

OTHER CHANDLER FEATURES—These include: Left side drive with center control; unit power plant; Bosch magneto; 120 inch wheel base; luxurious ten and twelve inch full tufted upholstery; finest quality mohair top with jiffy curtains; Firestone demountable rims; built-in wind-shield; Solar electric lamps; genuine motor driven electric horn; Jones speedometer; clock; portable electric lamp and other high grade features of similar nature.

Is it any wonder that early announcements of this revolutionary car set the whole automobile industry to talking—other builders of "sixes" and "fours" to worrying?

An Agency that Will Give You the Advantage Over Every Competitor

YOU dealers who are alive to conditions know that this is the day of the "six". You know how difficult it is to find a reliable popular priced "six"—a car on which you can really get deliveries.

You want a *real* "six" not an experiment, not a built-up "four". And it must be light. Light, not in an advertising catch-phrase sense, but light in *honest* weight.

It must be high grade as regards materials and workmanship. It must be speedy and sturdy. It must be complete as regards equipment and accessories. Also, it must be built by men of *known* reputation; not by unknowns.

And it must sell at a *popular* price. The high priced cars have had their day as have the "fours".

The Chandler Light Six is just such a car—and the *only* such car on the market today. It is a *real* "six"—strictly high grade in every sense, from top to tires.

And the price—\$1,785, is what will make it the greatest seller of the season. No man will want to buy a "four" when he can get such a "six" at such a price.

You can sell the Chandler Light Six in competition with anything on the market—on any basis whatever. It will give *you* the advantage over every competitor in your territory. No other manufacturer can offer today such a car at such a price, because no other manufacturer possesses the necessary experience combined with the manufacturing advantages possessed by the builders of the Chandler.

The Chandler Light Six will be extensively advertised, not only in magazines of national distribution, but in the newspapers in the various territories as well, where it will do the most good for the individual dealers.

Study the lines of this extraordinary car; read the specifications; and see if you don't agree with us that the Chandler Light Six agency is the MOST DESIRABLE, the MOST PROFITABLE automobile agency obtainable today.

SPECIFICATIONS

WEIGHT. 2,979 pounds, ready for the road.
LEFT SIDE DRIVE—Center Control.

WHEEL BASE. 120 inches.

WHEELS. Artillery type—34x4 inches. Firestone Demountable Rims.

MOTOR. 35 H.P. 33x5 inches. "L" Head type. Cylinders cast in two blocks. Valves enclosed. Imported chains driving cam shaft, pump and magneto. Cam shaft and cams cut from solid drop forging. Heavy crank shaft.

OILING. Oiling by positive gear pump in oil base. Accessible filling tube for oil reservoir. Oil gauge on motor base. All exterior oil pipes eliminated.

IGNITION. Bosch High Tension Magneto.

CARBURETOR. Stromberg "Little Six." Hot air and dash priming attachments.

SELF STARTER. Westinghouse Electric Starter built into motor. All moving parts enclosed.

COOLING. Centrifugal pump. High class square-tube radiator.

ELECTRIC LIGHTING. Westinghouse Electric Lighting Generator with large storage battery. Solar electric headlights, Solar electric side lamps built into wind-shield, and Solar tail lamp in combination with illuminated license bracket.

CLUTCH. Multiple disc, ball bearing. Discs of Raybestos and steel in oil tight case with motor.

TRANSMISSION. Three speeds and reverse.

REAR AXLE. Floating type. Annular ball bearings in wheels, shafts and differential. Drive shafts removable.

STEERING GEAR. Irreversible and adjustable for wear. Ebonized steering wheel.

GASOLINE SYSTEM. 20 gallon tank suspended in rear.

BODY. Five passenger. Stream line coach design.

UPHOLSTERING. 10 and 12 inch cushions. High grade tufted leather. High grade springs. Rear seat 48 inches in width. High backs on front and rear seats.

WIND-SHIELD. Built in without rods or braces. Adjustable for rain vision or ventilation.

TOP. Mohair top with "Jiffy" curtains. Patent locking top holders.

HORN. Genuine motor driven electric.

JONES SPEEDOMETER.

COLOR AND FINISH. Bodies, wheels, frame and running gear finished in handsome dark blue with silver stripe. Fenders, hood and cowl black. All hardware, lamps and fittings full nicked.

PRICE. \$1,785.00. Chassis only, \$1,585.00.

*You'll Have to Hurry if You
Want the Agency for this
Wonderful Car*

ALTHOUGH the first advertisements of the Chandler Light Six are just appearing, a large number of dealers have already secured valuable *territory* rights. You can imagine the rush to obtain *agency* rights that will follow the publication of these advertisements.

If your territory is still open and you want the agency for this truly sensational car—and no knowing dealer can help but want it—don't lose a minute in making application. Better wire us. Any other method may mean that your competitor has beaten you to it.

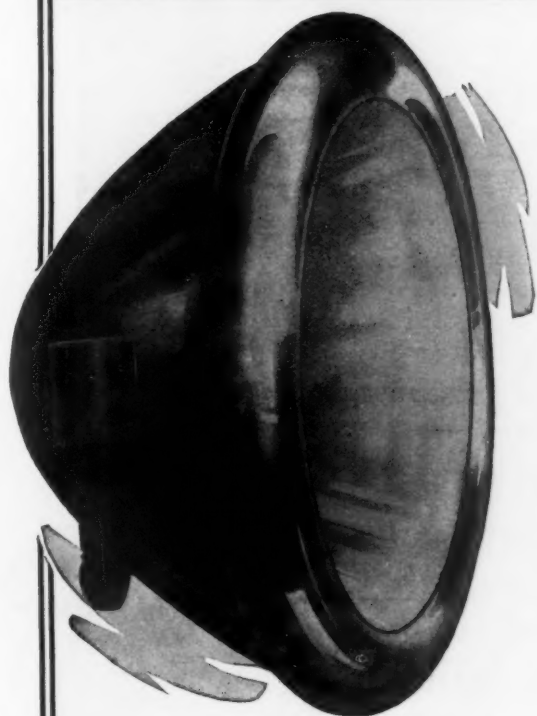
Car buyers everywhere are actually hungry for just such a car as the Chandler Light Six. No wise dealer will pass up this business that is waiting for him.

Deliveries commence July 1st.

THE CHANDLER MOTOR CAR CO.

205-225 E. 131st St.

Cleveland - - - Ohio



Electric Lamps

**The First and
Only Lamps that
Pierce Rain, Fog
and Dust**

Here is the newest and best proposition of the year for the motorist. Our immense new factory is now in operation. We are ready to supply everyone, everywhere.

Every sunset proves the principles that make Golden Glow Lamps the best possible lights for the automobile.

You've seen the golden sunsets—gold because only the yellow rays pierce the envelope of mist.

This is the principle which makes Golden Glow Lamps "Pierce Rain, Fog and Dust"—the best light ever made for the motorist.

You'll know them by their distinctive appearance. The mirrored glass reflectors are backed by a secret process making them—**Green By Day—Golden By Night.**

Golden Glow Reflectors need no polishing—they are always brilliant. They cannot be scratched like polished metal reflectors. They will never tarnish.

By a new process, Golden Glow reflectors are mounted in the lamps so as to be unbreakable. This lamp construction besides strength has no latches, hinges or projecting parts except the brackets, making—

The Most Beautiful Lamps Ever Made

Golden Glow Lamps add the final touch of refinement to the finest cars in addition to giving the best road light for all conditions.

Send for full particulars today.

THE ESTERLINE CO.

223 E. South St., Indianapolis, Ind.

**"Golden Glow Lamps Help to Sell
the Car. Specify Them"**

Special Dealers Offer

Means added profit—and real co-operation in a big, vital feature of your business. We are going to put Golden Glow Lamps in the hands of five thousand live dealers.

Will you be one of them?

If you want the liveliest, surest proposition in the automobile field, send in this coupon today.

Send the Golden Glow Dealers Proposition to
THE ESTERLINE CO., 223 E. South St., Indianapolis, Ind.



AN estimate of Speedwell excellence depends upon a comparison rather than a description. You must have some form of mental yardstick to judge quality just as you instinctively judge other characteristics.

Base your judgment of the Speedwell "Six" upon what you know—or can learn—of cars for which much higher prices are asked.

We are not content to have you think that the Speedwell is merely the best car you can buy at its price, because careful comparison must convince you that there is no better car at any price.

If you will carry your investigation to the fullest length possible, you will not need to be told why this car finds its larger proportion of buyers among those best posted upon automobile values.

Standard chassis has 134-inch wheelbase; six-cylinder long stroke motor; electric starting and lighting system; independent Bosch dual ignition; complete and high-grade equipment.

4 and 5 Passenger Model, \$2850

7 Passenger Model, \$2950

THE SPEEDWELL MOTOR CAR CO., Dayton, O.

When Writing to Advertisers, Please Mention Motor Age.

Automobile Axles of Known Quality

We Have Open Capacity for 1914

and are in position to handle contracts for the highest grade pleasure car axles for both gas cars and electrics.

On standard cars of several well known makes, Metal Products axles have won a high reputation for long wear, silence, fine workmanship and finish. For the past several years we have built *all* of the axles for two of the best known cars. An investigation will show you that there are no better axles built.

Our pressed steel housing type rears are light in weight, unusually rigid and silent.

We are fully equipped to build to your specifications or furnish standard type. Materials and Workmanship fully guaranteed. *Deliveries as you want them, assured.* Write us before placing your contract.

Metal Products Company
Detroit, Michigan

The Part That Chrome Vanadium Steel Plays In *American Axles*

CHROME VANADIUM STEEL is used for the Axle Shafts and Drive Shafts of *American Axles* because we have disregarded the element of cost in materials for the much more important factor of quality that is without an equal today in axle construction.

The value of Vanadium as an alloy lies in the fact that its addition—either alone or with Chrome—renders steel many times tougher and increases its resistance to fatigue, to shock and to stresses, far in excess of the results obtained with any other known alloys.

To its inherent qualities, greater improvement can be added by heat treatment than is possible with any other steel, and this we accomplish, in our own plant, by formulas that we have tested and proved a countless number of times.

It will be seen, therefore, that Chrome Vanadium Steel is ideal for Axle Shafts, because, having much greater strength than the ordinary carbon steels, we can use it in smaller diameters; lessening weights, yet securing greater efficiency than any other steel can give.

Every quality possessed by Chrome Vanadium Steel constitutes a characteristic that should be demanded by the man who pays the final price for an automobile axle.

This company, through the manufacturers whom it supplies with axles, has anticipated this demand by building into *American Axles* a greater degree of worth and security than can be obtained by the use of any other materials.

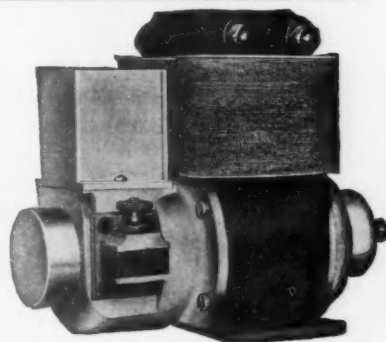
We believe it to be not only the part of wisdom, but of common honesty, to place Reliability—at any cost—before any other consideration.

American Axles embody not only the highest grade of materials, but are unequalled in design and workmanship. They constitute the last word in axle construction, and are, therefore, the first and best index of a car's quality.

The American Ball-Bearing Co., Cleveland, O.

ELECTRIC LIGHTING FOR \$37.50

*The Best
Proposition on
the Market for
the OWNER*



*The Best
Proposition of
the Year for
the DEALER*

THE FISHER LIGHTING OUTFIT

Is the simplest, most efficient, and least expensive electric lighting outfit made.

Anyone with ordinary intelligence and a little mechanical ability can install this outfit because—

There are no intricate parts, no difficult wiring, no technical instructions.

There are no governors, springs, regulators or other devices to get out of order.

For the very reasonable price of \$37.50, you can have the convenience, cleanliness, safety and reliability of electric lights on your car.

Why bother with an undependable generator or the gas tank, prone to emptiness. Why get out in the mud or rain to light your lights.

Use the Fisher Outfit for \$37.50

We have been making electrical apparatus for 30 years and we know this outfit is right.

If your dealer hasn't our catalog send to us for it and tell us who your dealer is and we'll send him one.

We want a first class dealer in every town—our proposition is one that will specially interest a dealer alive to his own interests.

There are over 800,000 automobiles that do not carry electric lights.

Every motorist wants the newest and best thing in motoring help and is open to intelligent instruction by his dealer.

Electric lights are inevitable—they are coming just as surely as the incandescent bulb superseded the gas jet in the home.

Why not be ready for them? Why not now lay the foundation for your future business?

We are offering the most efficient and simplest electric lighting outfit made—and offering it so that you can sell it to your customers for the amazing price of \$37.50.

How can we do it? Its very simplicity is the answer.

When you consider the great field you have in which to work, and the splendid selling price for an article that is absolutely right and

Covered By A Positive Guarantee

You cannot afford to do otherwise than write us at once for our proposition to our dealers.

Anyone with ordinary intelligence and a small mechanical ability can install our outfit—we send outline and full and simple instructions.

Write us today and get in touch with this profit that will build a future business for you.

FISHER ELECTRICAL WORKS, 1500 Larned St., DETROIT, MICH.

The Part That Chrome Vanadium Steel Plays In *American Axles*

CHROME VANADIUM STEEL is used for the Axle Shafts and Drive Shafts of *American Axles* because we have disregarded the element of cost in materials for the much more important factor of quality that is without an equal today in axle construction.

The value of Vanadium as an alloy lies in the fact that its addition—either alone or with Chrome—renders steel many times tougher and increases its resistance to fatigue, to shock and to stresses, far in excess of the results obtained with any other known alloys.

To its inherent qualities, greater improvement can be added by heat treatment than is possible with any other steel, and this we accomplish, in our own plant, by formulas that we have tested and proved a countless number of times.

It will be seen, therefore, that Chrome Vanadium Steel is ideal for Axle Shafts, because, having much greater strength than the ordinary carbon steels, we can use it in smaller diameters; lessening weights, yet securing greater efficiency than any other steel can give.

Every quality possessed by Chrome Vanadium Steel constitutes a characteristic that should be demanded by the man who pays the final price for an automobile axle.

This company, through the manufacturers whom it supplies with axles, has anticipated this demand by building into *American Axles* a greater degree of worth and security than can be obtained by the use of any other materials.

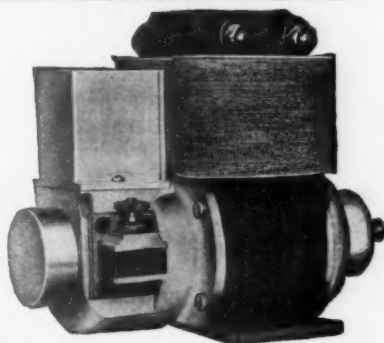
We believe it to be not only the part of wisdom, but of common honesty, to place Reliability—at any cost—before any other consideration.

American Axles embody not only the highest grade of materials, but are unequalled in design and workmanship. They constitute the last word in axle construction, and are, therefore, the first and best index of a car's quality.

The American Ball-Bearing Co., Cleveland, O.

ELECTRIC LIGHTING FOR \$37.50

*The Best
Proposition on
the Market for
the OWNER*



*The Best
Proposition of
the Year for
the DEALER*

THE FISHER LIGHTING OUTFIT

Is the simplest, most efficient, and least expensive electric lighting outfit made.

Anyone with ordinary intelligence and a little mechanical ability can install this outfit because—

There are no intricate parts, no difficult wiring, no technical instructions.

There are no governors, springs, regulators or other devices to get out of order.

For the very reasonable price of \$37.50, you can have the convenience, cleanliness, safety and reliability of electric lights on your car.

Why bother with an undependable generator or the gas tank, prone to emptiness. Why get out in the mud or rain to light your lights.

Use the Fisher Outfit for \$37.50

We have been making electrical apparatus for 30 years and we know this outfit is right.

If your dealer hasn't our catalog send to us for it and tell us who your dealer is and we'll send him one.

We want a first class dealer in every town—our proposition is one that will specially interest a dealer alive to his own interests.

There are over 800,000 automobiles that do not carry electric lights.

Every motorist wants the newest and best thing in motoring help and is open to intelligent instruction by his dealer.

Electric lights are inevitable—they are coming just as surely as the incandescent bulb superseded the gas jet in the home.

Why not be ready for them? Why not now lay the foundation for your future business?

We are offering the most efficient and simplest electric lighting outfit made—and offering it so that you can sell it to your customers for the amazing price of \$37.50.

How can we do it? Its very simplicity is the answer.

When you consider the great field you have in which to work, and the splendid selling price for an article that is absolutely right and

Covered By A Positive Guarantee

You cannot afford to do otherwise than write us at once for our proposition to our dealers.

Anyone with ordinary intelligence and a small mechanical ability can install our outfit—we send outline and full and simple instructions.

Write us today and get in touch with this profit that will build a future business for you.

FISHER ELECTRICAL WORKS, 1500 Larned St., DETROIT, MICH.

The Part That Chrome Vanadium Steel Plays In *American Axles*

CHROME VANADIUM STEEL is used for the Axle Shafts and Drive Shafts of *American Axles* because we have disregarded the element of cost in materials for the much more important factor of quality that is without an equal today in axle construction.

The value of Vanadium as an alloy lies in the fact that its addition—either alone or with Chrome—renders steel many times tougher and increases its resistance to fatigue, to shock and to stresses, far in excess of the results obtained with any other known alloys.

To its inherent qualities, greater improvement can be added by heat treatment than is possible with any other steel, and this we accomplish, in our own plant, by formulas that we have tested and proved a countless number of times.

It will be seen, therefore, that Chrome Vanadium Steel is ideal for Axle Shafts, because, having much greater strength than the ordinary carbon steels, we can use it in smaller diameters; lessening weights, yet securing greater efficiency than any other steel can give.

Every quality possessed by Chrome Vanadium Steel constitutes a characteristic that should be demanded by the man who pays the final price for an automobile axle.

This company, through the manufacturers whom it supplies with axles, has anticipated this demand by building into *American Axles* a greater degree of worth and security than can be obtained by the use of any other materials.

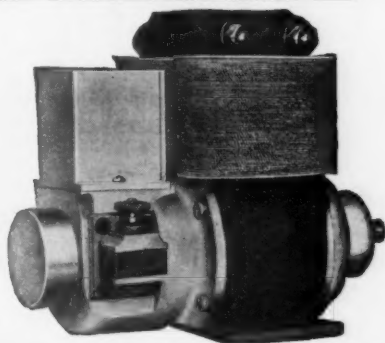
We believe it to be not only the part of wisdom, but of common honesty, to place Reliability—at any cost—before any other consideration.

American Axles embody not only the highest grade of materials, but are unequalled in design and workmanship. They constitute the last word in axle construction, and are, therefore, the first and best index of a car's quality.

The American Ball-Bearing Co., Cleveland, O.

ELECTRIC LIGHTING FOR \$37.50

*The Best
Proposition on
the Market for
the OWNER*



*The Best
Proposition of
the Year for
the DEALER*

THE FISHER LIGHTING OUTFIT

Is the simplest, most efficient, and least expensive electric lighting outfit made.

Anyone with ordinary intelligence and a little mechanical ability can install this outfit because—

There are no intricate parts, no difficult wiring, no technical instructions.

There are no governors, springs, regulators or other devices to get out of order.

For the very reasonable price of \$37.50, you can have the convenience, cleanliness, safety and reliability of electric lights on your car.

Why bother with an undependable generator or the gas tank, prone to emptiness. Why get out in the mud or rain to light your lights.

Use the Fisher Outfit for \$37.50

We have been making electrical apparatus for 30 years and we know this outfit is right.

If your dealer hasn't our catalog send to us for it and tell us who your dealer is and we'll send him one.

We want a first class dealer in every town—our proposition is one that will specially interest a dealer alive to his own interests.

There are over 800,000 automobiles that do not carry electric lights.

Every motorist wants the newest and best thing in motoring help and is open to intelligent instruction by his dealer.

Electric lights are inevitable—they are coming just as surely as the incandescent bulb superseded the gas jet in the home.

Why not be ready for them? Why not now lay the foundation for your future business?

We are offering the most efficient and simplest electric lighting outfit made—and offering it so that you can sell it to your customers for the amazing price of \$37.50.

How can we do it? Its very simplicity is the answer.

When you consider the great field you have in which to work, and the splendid selling price for an article that is absolutely right and

Covered By A Positive Guarantee

You cannot afford to do otherwise than write us at once for our proposition to our dealers.

Anyone with ordinary intelligence and a small mechanical ability can install our outfit—we send outline and full and simple instructions.

Write us today and get in touch with this profit that will build a future business for you.

FISHER ELECTRICAL WORKS, 1500 Larned St., DETROIT, MICH.

Experiences in Lubrication

The following letters from users of automobile lubricating oils are a few of the hundreds of a similar nature which we are constantly receiving.

"Here is a record of our experience with your Gargoyle Mobiloil Arctic, which we have been using for motor lubrication in one of our road instruction cars.

"The car is a Willys-Overland, Model T-65, 35 H. P., 5-passenger touring car. The test covered a period of ten weeks, during which time the car was driven 2924 miles and consumed 17 quarts of oil, or an average of 172 miles to the quart.

"The motor has at all times performed its work perfectly and we have been unable to discover any indication of carbon deposits.

"We cheerfully recommend your oils to motorists desiring a lubricant productive of efficiency."

"About four months ago your representative, Mr. C——, called to sell me some lubricating oil, and as I am master-mechanic for the Fulton & Flatbush Storage Co. (who are operating twelve 1000 'Chase' delivery wagons, which are rented to department stores by the week, all up-keep and supplies being furnished by us), it is to my interest to operate these trucks as economically as possible. I became very much interested in what Mr. C—— had to say regarding 'B' Mobiloil, being satisfied it was the oil I was looking for if it would accomplish all he claimed for it.

"Up to this writing I have used three barrels of this oil and getting better lubrication than I ever had before. The 'Chase' is a 2-cycle, air-cooled engine. I

am using less of 'B' Mobil-oil than any other lubricating oil and am getting more miles out of the gasoline."

"One of our customers purchased a barrel of Gargoyle Mobiloil and used it constantly for a year. During that period he ran his own car 23,000 miles, and in addition to using the oil in his own car he occasionally gave some to his friends calling on him, and put some in a small car which he occasionally used in getting back and forth from the city of Philadelphia.

"This goes to prove conclusively to the writer that in most cases people are using entirely too much oil in their cars, as his car today is in magnificent condition in every respect and he has been getting plenty of oil for lubrication."

"As chief engineer of the

American Locomotive Company's automobile department, I have made exhaustive tests of a number of high-grade gas-engine oils. I have found Gargoyle Mobiloil Arctic to be the best suited to the Alco motors and recommend it to users of Alco cars.

"It possesses excellent lubricating properties, does not carbonize to any extent if used in proper quantities, and has the right viscosity, flash and fire test for our motors."

"My customers consist of doctors, business men and mercantile firms, whose business necessitates the use of their machines in any and all weather conditions.

"I have never had a lubricant that has given the satisfaction Gargoyle Mobiloil has and I have tried them all.

"I have never had a complaint on Gargoyle Mobil-oils, but, on the contrary, have as enthusiastic boosters every man to whom I have sold Gargoyle Mobil-oils."

The lubricating chart printed in part on this page represents our professional advice.

A booklet containing our complete lubricating chart, together with points on lubrication, will be mailed you on request.



Mobiloil

A grade for each type of motor

The various grades, refined and filtered to remove free carbon are:

Gargoyle Mobiloil "A"
Gargoyle Mobiloil "B"
Gargoyle Mobiloil "D"
Gargoyle Mobiloil "E"
Gargoyle Mobiloil "Arctic"

They are put up in 1 and 5 gallon sealed cans, in half-barrels and barrels. All are branded with the Gargoyle, which is our mark of manufacture.

VACUUM OIL CO., Rochester, U. S. A.

BRANCHES:

NEW YORK	BOSTON	PHILADELPHIA	DETROIT	INDIANAPOLIS	CHICAGO
29 Broadway	49 Federal St.	4th & Chestnut Sts.	Ford Bldg.	Indiana Pyth. Bldg.	Fisher Bldg.

Distributing Warehouses in the principal cities of the world

When Writing to Advertisers, Please Mention Motor Age.



Explanation: In the schedule, the letter opposite the car indicates the grade of Gargoyle Mobiloil that should be used. For example: "A" means "Gargoyle Mobiloil A." "Arc." means "Gargoyle Mobiloil Arctic." For all electric vehicles use Gargoyle Mobiloil A. The recommendations cover both pleasure and commercial vehicles unless otherwise noted.

MODEL OF CARS	1909		1910		1911		1912		1913	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Abbott Detroit	A	A	A	A	A	A	A	A	A	A
Aldo	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc
Alston	A	A	A	A	A	A	A	A	A	A
Apperson	A	A	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc
Autocar (2 cy.)	A	A	A	A	A	A	A	A	A	A
" (4 cy.)	A	E	A	E	A	E	A	E	A	E
Avery	A	A	A	A	A	A	A	A	A	A
Bent	A	A	A	A	A	A	A	A	A	A
Bentley (2 cy.)	A	A	A	A	A	A	A	A	A	A
" (4 cy.)	A	A	Arc	Arc	A	A	A	A	A	A
Cadillac (1 cy.)	A	A	A	A	A	A	A	A	A	A
" (4 cy.)	B	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc
Carters	A	A	A	A	A	A	A	A	A	A
Cash	A	A	A	E	A	A	A	E	A	B
Cass	A	A	A	A	A	A	A	A	A	A
Chalmers	Arc	Arc	Arc	Arc	A	Arc	Arc	Arc	Arc	Arc
Chase	B	B	B	B	B	B	B	B	B	B
Cole	A	B	Arc	Arc	A	A	Arc	Arc	Arc	Arc
Columbia	A	A	A	A	A	A	A	A	A	A
Corbin Gear	A	A	A	A	A	A	A	Arc	A	Arc
Daimler	A	E	A	E	A	A	A	A	A	A
" "Knight"	A	E	A	E	A	A	A	A	A	A
Darracq	A	E	A	E	A	A	A	A	A	A
De Dion	A	A	A	A	A	A	B	B	B	A
Delsman-Belleville	B	A	B	A	B	A	B	A	B	A
Emory	A	A	Arc	Arc	Arc	Arc	Arc	Arc	A	A
E. M. F.	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	A	A
Fiat	A	A	A	B	A	A	A	B	B	A
Flanagan	A	A	A	A	A	A	A	A	Arc	Arc
" (6 cy.)	B	E	A	Arc	B	E	E	E	E	E
Ford	B	E	B	B	A	Arc	A	A	A	A
Franklin	B	A	B	A	B	A	A	Arc	A	Arc
G. M. C.	A	A	A	A	A	A	A	A	A	A
Gramm	A	A	A	A	A	Arc	A	Arc	A	Arc
Gramm-Logan	A	Arc	A	Arc	A	A	A	A	A	Arc
Herreshoff	A	A	A	Arc	A	A	A	A	A	Arc
Hayitt (2 cy.)	A	A	A	A	A	Arc	A	A	A	A
Healey	A	A	A	A	A	A	A	A	A	A
Hudson	A	A	Arc	Arc	Arc	Arc	A	Arc	A	Arc
Hupmobile "20"	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc
" "32"	A	Arc	Arc	Arc	Arc	Arc	Arc	Arc	A	Arc
I. H. C. (12)	A	A	A	A	A	A	A	A	B	A
" (16)	B	A	B	A	B	A	B	A	B	A
International	A	E	A	E	A	Arc	A	Arc	A	A
Isotta	A	A	A	A	A	A	A	A	A	A
Italy	A	A	A	A	A	A	A	A	A	A
Jackson (2 cy.)	A	A	A	A	A	A	A	A	A	A
Kelly	A	A	A	A	Arc	Arc	Arc	Arc	A	A
Kelly Springfield	A	A	A	A	A	A	A	A	Arc	Arc
Klein-Karl	A	E	A	E	A	Arc	A	Arc	A	Arc
"Com'l."	A	A	A	A	Arc	Arc	Arc	Arc	Arc	Arc
Kline/Karl	B	A	B	A	Arc	Arc	B	A	Arc	Arc
Krit	B	A	B	A	B	A	B	A	B	A
Lancia	B	A	B	A	B	Arc	B	A	B	Arc
Laconville	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc
Lea	A	A	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc
Lehigh	A	A	A	A	A	A	A	A	A	A
Marion	A	A	A	E	A	A	A	A	A	Arc
Marmion	Arc	Arc	A	E	A	Arc	A	A	A	A
Matheson	Arc	Arc	Arc	Arc	A	A	A	A	A	Arc
Maxwell (2 cy.)	A	E	E	E	A	A	E	E	A	A
" (4 cy.)	A	E	E	E	A	A	A	A	A	A
Mercedes	A	E	A	E	A	E	A	E	A	B
" "Knight"	A	E	A	E	A	E	A	E	A	B
Morse	A	A	A	A	A	A	A	A	A	A
Mitsubishi	A	A	Arc	Arc	A	Arc	A	Arc	A	Arc
Minerva	A	A	A	A	A	A	A	A	A	A
Minervin "Knight"	A	A	A	A	A	A	A	A	A	A
Mitchell	A	A	Arc	Arc	A	A	A	A	A	A
Moon	A	A	E	E	A	Arc	Arc	Arc	A	A
National	A	Arc	A	A	A	A	A	A	A	A
Service	A	A	A	A	A	Arc	A	A	A	Arc
Oldsmobile	A	A	A	A	A	A	A	A	A	A
Overland	A	E	A	E	A	Arc	Arc	A	A	A
Packard	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	A	A
Paige Detroit	A	E	A	E	A	A	A	E	A	B
Paillard	A	E	A	E	A	A	A	A	A	A
" "Knight"	A	E	A	E	A	A	A	A	A	A
Pathfinder	A	A	A	A	A	A	A	A	A	A
Peoria	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc
Pierce Arrow	A	Arc	Arc	Arc	A	Arc	A	Arc	Arc	Arc
Pope Hartford	A	A	A	A	A	A	A	A	A	A
Primmer	A	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc
Pullman	A	A	A	A	A	A	A	A	A	A
Rambler	A	E	A	E	A	Arc	Arc	Arc	Arc	Arc
Rapid	A	A	A	A	A	A	A	A	A	A
Rayford	A	A	A	A	A	Arc	Arc	A	A	A
Reo	A	A	A	A	A	A	A	A	A	A
Renault	A	Arc	A	Arc	A	Arc	A	A	A	A
Reo	A	A	E	A	A	A	A	A	A	A
S. G. V.	A	A	A	A	B	A	B	A	B	A
Selden	A	E	A	E	A	E	A	Arc	Arc	Arc
Service	A	A	A	A	A	A	A	A	A	A
Simplex	A	A	A	A	A	A	A	A	A	A
Speedwell	A	Arc	Arc	Arc	A	Arc	A	Arc	Arc	Arc
" "Mead"	A	A	A	A	A	A	A	A	A	A
Stanley	D	D	D	D	D	D	D	D	D	D
Stearns	A	A	Arc	Arc	A	Arc	A	Arc	A	A
Stinson	A	A	A	A	A	A	A	A	A	A
Stevens Duryea	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc	Arc
Stoddard-Dayton	E	E	Arc	Arc	A	A	A	A	A	A
" "Knight"	A	A	A	A	A	A	A	A	A	A
Strohbecker	A	E	E	E	A	Arc	Arc	Arc	Arc	Arc
Thompson	A	A	A	A	A	A	A	A	A	A
Thoma	E	E	E	E	E	E	E	E	E	E
Walter	A	E	E	E	Arc	Arc	Arc	Arc	Arc	Arc
Warren Detroit	A	Arc	Arc	A	A	A	A	A	A	A
White (Gas)	A	A	A	A	A	A	A	A	A	A
Winton	E	B	A	A	A	A	D	A	A	A



The New Baker Electric Roadster

—an electric roadster that a man will want not only for his own use in business and pleasure, but for his wife to drive; to get her out into the open, to enable her to visit her friends and pay her social duties without traveling in close, dirty street cars; to make her independent of a chauffeur.

There has been a strong call for such a car—an open-body town and suburban car—and in this magnificent new Baker model, with its strong, speedy lines, we have produced an electric that will please the eye and meet the need of every man and woman.

It's a Thorough Baker in Outline and Construction

This alone vouches for its mechanical excellence. It has speed, power, responsiveness, and a mileage radius greater than that of any other electric.

It has wheel steer or lever steer; 34-cell battery equipment; standard Baker shaft drive, famous for current economy; beautifully upholstered in blue leather with gray-striped blue body and running gear.

Fenders are metal, full curved and skirted to frame. Equipment includes full set of lamps, side curtains, Western volt ammeter, shaft odometer, full kit of tools, rain vision wind shield, tube horn.

Baker Broughams and Coupes have no superiors in appearance or service efficiency.

There are some valuable territories still open to the right dealers who can represent the Baker as this magnificent line of electrics must be represented. If you are in this position, *write for our proposition.*

THE BAKER MOTOR VEHICLE COMPANY, CLEVELAND, OHIO

Canada: The Baker Motor Vehicle Company of Canada, Ltd., Walkerville, Ontario

Builders also of Baker Electric Trucks

Branches or Dealers in Principal Cities

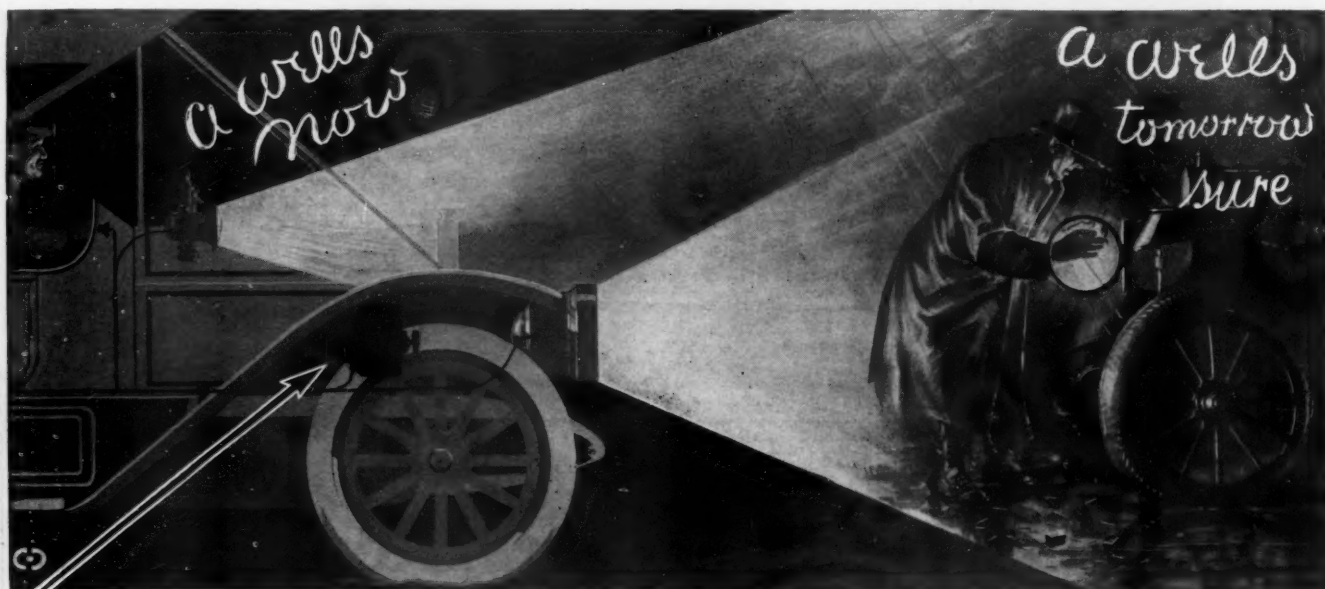
Baker Electrics



When Writing to Advertisers, Please Mention Motor Age.

YOU KNOW YOU LOOK RIDICULOUS ↘

TO THE FOLKS IN THE CARS FITTED WITH GENUINE WELLS GENERATORS



when they catch you in this fix and pass you—while you get out in the pitch dark and disagreeable weather to *scratch 1000 matches* (near explosives at that.)

BUT WHAT MAKES YOU HOT UNDER THE COLLAR

is to learn that you actually pay more for these inconveniences of an antiquated gas-lighting system than you would need to pay for an up-to-date, snappy-looking and convenient **ELECTRIC LIGHTING SYSTEM**. You can operate the

WELLS GENERATOR

by simply pushing a button from the driver's seat, and *without any upkeep cost at all* because the only thing that is consumed is the otherwise wasted energy of your engine.

The Wells adjusts itself automatically for all conditions. It produces a sufficient amount of current to provide for all the lights when the car is running slow. It keeps the battery charged so as to furnish sufficient light when the car is standing still. And by means of

THE MAGNETIC SHUNT

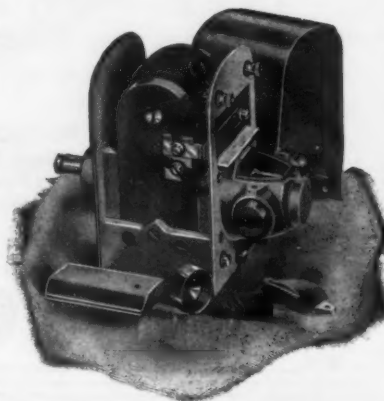
the current is automatically reduced at high speeds (to safeguard the battery from an overcharge.)

IT OUTLASTS THE CAR because of its light weight (only 19½ lbs.) and its simplicity (*only two moving parts.*)

It is easy to install by your garage man or a competent chauffeur. The wiring is very simple.

Write for Booklet and Prices. Garage Men write for our Liberal Dealers' Proposition. (*Quick Money.*)

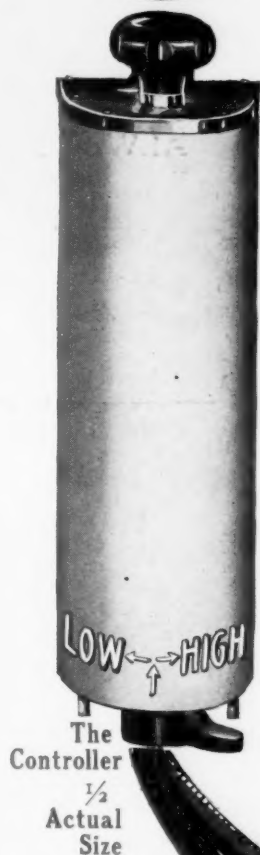
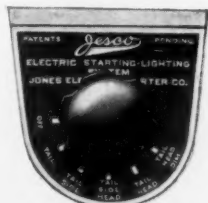
R. C. WELLS MANUFACTURING CO., WELLS BUILDING
Fond du Lac, Wis.



Jesco Assures 100% Starting Efficiency

The Jesco Starting and Lighting system for automobiles has been produced to meet the universal demand for a simple, reliable, light weight system that is 100 per cent efficient.

TOP VIEW



In designing the Jesco, our engineers have never lost sight of the fact that size and weight must be kept at a minimum with a maximum of cranking torque and generating capacity to insure a practical and satisfactory system. As a result the Jesco is very noticeably smaller, lighter and more efficient than any other starting and lighting system on the market today.

Jesco starting and lighting systems have been adopted as standard equipment on several well known cars during the past year and are giving the kind of service that makes every owner a booster.

The system is very simple and compact, of the single unit type, and consists of the controller, the motor-generator, and a storage battery with the necessary wiring.

The control is so simple that anyone can operate it—pressure on the knob spins the engine, while turning the same knob gives the different combinations of lamps.

The "Controller" is usually mounted on the heel board between the two front seats or in some other convenient position.

It consists of a regulator, a cut out relay, and a controlling switch for the lights and starter.

The cut out relay acts as a check valve on the current to and from the battery, allowing the charging current to enter the battery but automatically disconnecting the generator when it is not operating. This prevents the discharging of the battery back through the generator.

The regulator allows for the variable speed of the generator and keeps the charging rate at the same point, so that the battery is not overcharged or the lamps burned out.

The lighting switch has five lamp combinations and the "Off" position. This is operated by turning the knob to the position for the desired combination of lamps.

Pressure on the knob allows the current to flow from the battery to the starter and spin the engine.

Owing to the fact that in summer the days are longer, the current consumption is low and in winter it is high, therefore there is a regulating lever on the bottom of the controller which can be turned to "high" or "low" as the season requires.

TO GENERATOR →

Jones Electric Starter Co.

When Writing to Advertisers, Please Mention Motor Age.

Jesco TRADE MARK Backed by 20 Years' Engineering Experience

Less Weight—The Motor generator complete weighs only 45 pounds. About the same as the weight of either the motor or the generator in the separate unit system.

Easier to Install—Only one drive is necessary—doing away with one set of gears or chains, in addition to saving shafts, couplings and brackets for mounting.

More Simple—The combined unit does away with a duplication of parts—complexity of wiring—and is more accessible than the separate unit type.

Description of Motor Generator—The generator is of the multi-pole type, especially designed for this use and having special field windings that are in service as the starter is acting as a motor or as a generator. When the generator is acting as a motor—a gear transmission in the front part of the case is engaged which increases the gear ratio between the armature of the generator and the crank shaft of the engine, increasing the cranking torque.

When the engine is running the generator, the gear transmission is locked by the action of centrifugally actuated multiple disk clutch, then the generator armature has a ratio of 2 or 3 to 1 with the crank shaft. This will vary a little with different kinds of engines. No gears are in operation when running as a generator.

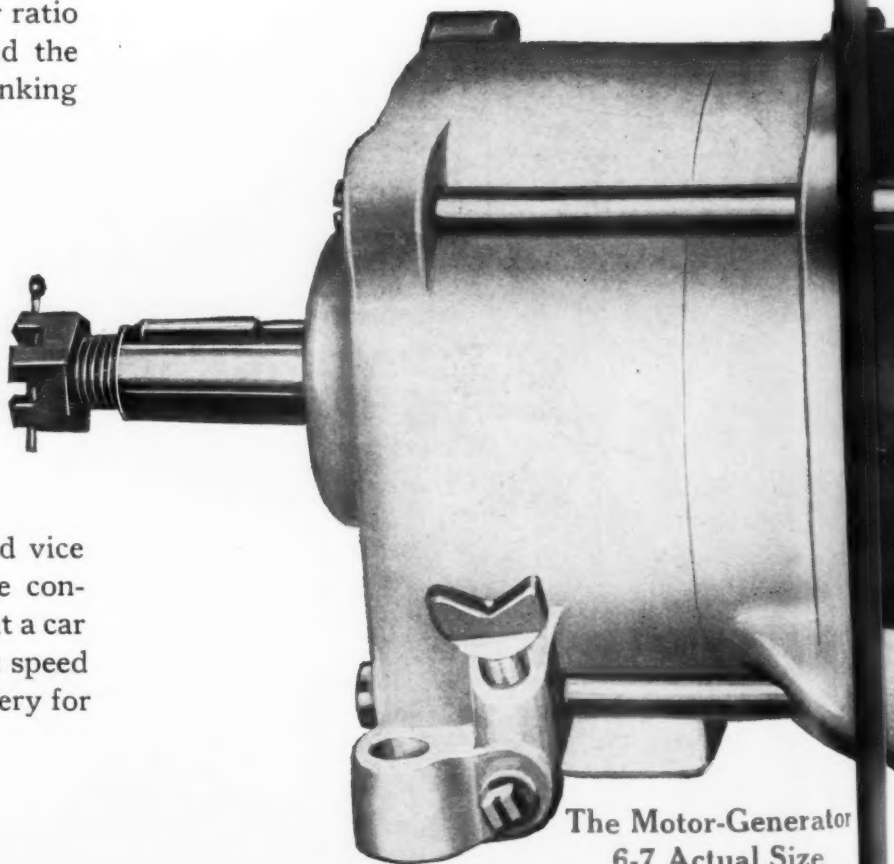
The changing from motor to generator and vice versa is automatically taken care of in the controller. The generator charges the battery at a car speed of 10 miles per hour, below that speed there is a slight draw on the battery for

the lights; above that speed the generator will carry the lights and also charge the battery.

The motor generator can be mounted on the engine crank case in much the same manner that a magneto is installed. It is connected to the engine crank shaft either by a chain of gears or a silent chain drive, and in some cases may be mounted on the transmission case.

Efficiency—On pressing the knob—the Jesco spins a big engine, under full compression and **DOES IT EVERY TIME.**

When the car is moving you **ALWAYS** have ample light and when it is standing you can burn all your lights for 12 hours continuously.



The Motor-Generator
6-7 Actual Size

Jones Electric Starter Co.

When Writing to Advertisers, Please Mention Motor Age.

Perfected by 6 Years' Practical Testing

Jesco
TRADE MARK

Utter Simplicity—With the single unit system you have one compact unit—instead of two separate instruments which are hard to find places for mounting and are more difficult and costly to install. The control is entirely automatic, relieving the driver of everything except pressing the knob or turning it.

The wiring is singularly free from complication and easily understood.

Compactness—The motor generator is small and compact and much more convenient on account of its size and shape (approximately $5\frac{1}{2} \times 5\frac{1}{2} \times 12$ ") to fit into the engine construction than the separate unit type. It is completely enclosed in an aluminum case and the finish leaves nothing to be desired.

Great Capacity—All parts of the Jesco System are so liberally proportioned to withstand strain that they are really working under normal conditions when they are carrying an abnormal load.

In an actual test the Jesco started a big engine 500 times in succession, then cranked the engine with the ignition switch off for $18\frac{1}{2}$ minutes, and then made 200 more starts.

At the end of this test the battery was not exhausted.

Durability—Only the highest grade of materials are used in the manufacture of the Jesco System. The magnetic frame of the starter is made of high grade, laminated, electrical sheet steel, solidly riveted together. The armatures are of laminated

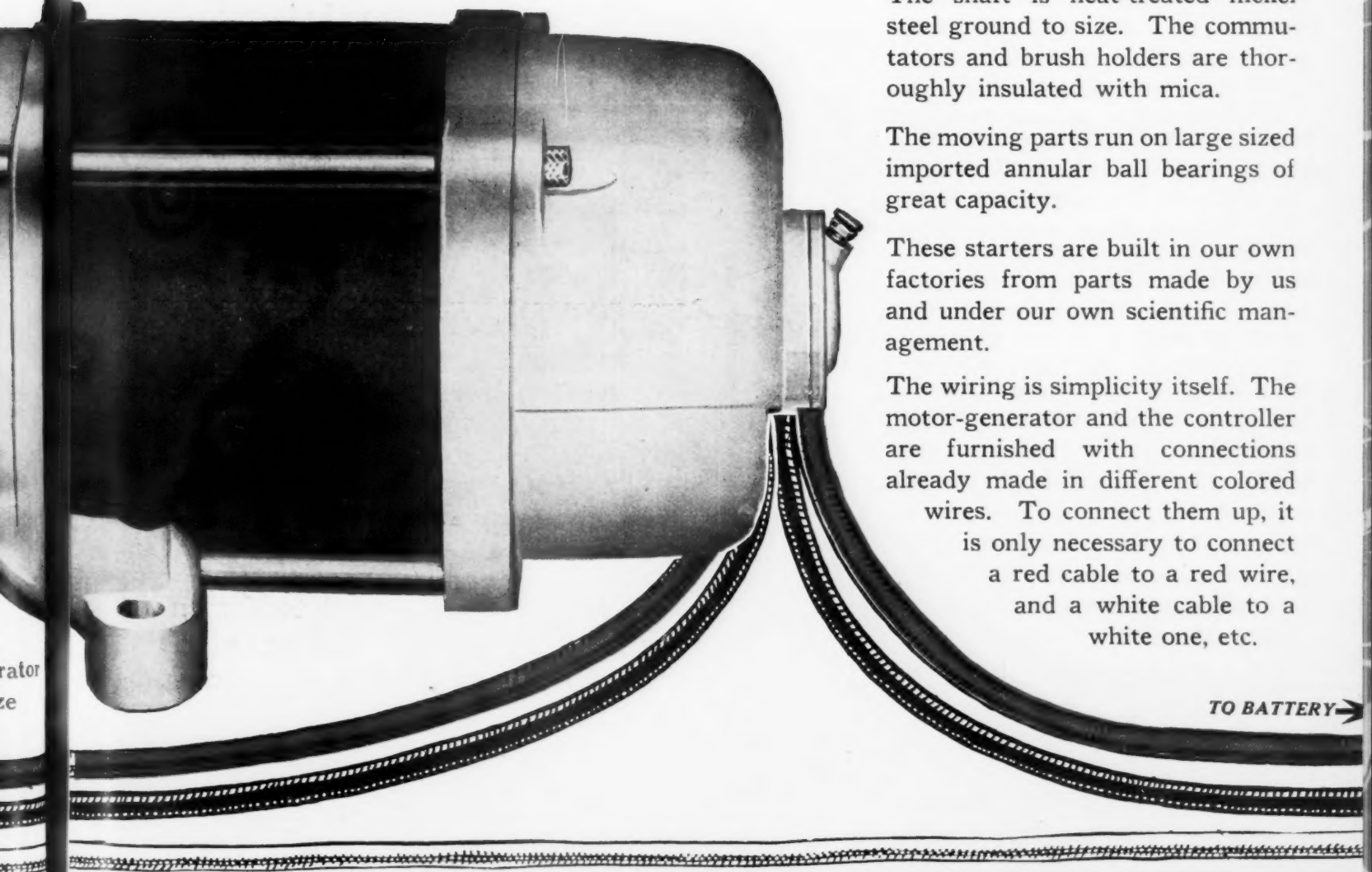
sheet steel construction with the windings held in place by wedges. The shaft is heat-treated nickel steel ground to size. The commutators and brush holders are thoroughly insulated with mica.

The moving parts run on large sized imported annular ball bearings of great capacity.

These starters are built in our own factories from parts made by us and under our own scientific management.

The wiring is simplicity itself. The motor-generator and the controller are furnished with connections already made in different colored wires. To connect them up, it is only necessary to connect a red cable to a red wire, and a white cable to a white one, etc.

TO BATTERY →



When Writing to Advertisers, Please Mention Motor Age. **Jones Electric Starter Co**

Jesco Facilities Insure Prompt Deliveries

The Jones Electric Starter Company is very closely connected with Roth Bros. & Co., of Chicago, Ill., manufacturers of the well known "Roth" motors and dynamos, and all of the parts for this system are made in the two plants.

Reputation of Twenty Years

Roth Bros. & Co. have been making electric motors and dynamos for the past twenty years and have a reputation second to none for the high quality and efficiency of their product.

Six Years of Testing

Their long and valuable experience gained through all these years of successful manufacture of electric motors and generators has been incorporated in the Jesco system, which was brought out after six years of testing and perfecting—an electric motor-generator to fit the special and exacting requirements of the automobile.

Every part that enters into the construction of the Jesco system is manufactured in these two big factories, each especially equipped with the latest machinery for the production of electric motors and generators.

Ample Facilities

Jesco systems are being made in large numbers today and the Jones Electric Starter Co., with their splendid facilities, is in an enviable position for their production in still larger quantities.

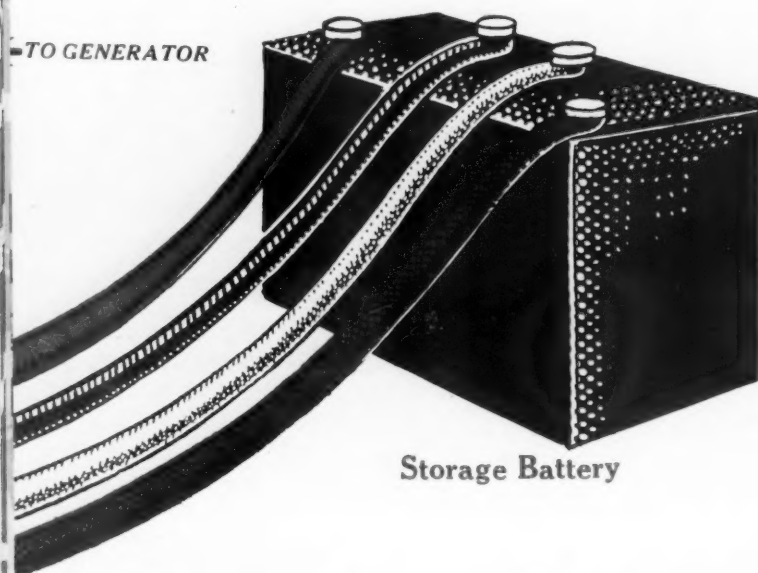
Deliveries are made promptly in accordance with contract specifications.

Prompt Deliveries

Our increased manufacturing capacity will allow us to accept some new business and still maintain our prompt delivery schedule.

Motor car manufacturers will find it greatly to their advantage to get in touch with us regarding their starting and lighting equipment.

Our engineers will be glad to demonstrate the simplicity and efficiency of the Jesco System upon one of your own cars.



Write Today

Jones Electric Starter Co.
Adams and Loomis Streets, Chicago, Ill.

The **BROWN** **COMMERCIAL CAR**

**Mr. Dealer: Business Men In Your Town Are Up Against
The Same Delivery Problems That Brown Commercial
Cars Are Solving For Thousands of Merchants
In The Same Or Identical Lines Of Business**

They solve superlatively the crying need for economy: BROWN COMMERCIAL CARS are so simple in design — so simple in operation — that they can be placed in the hands of the most inexperienced operator without fear of repair bills or heavy upkeep cost. Any man with intelligence enough to drive and care for a horse can drive and care for a BROWN.

You can sell two-thirds of the merchants in your town. Most of their requirements are to be met with a rapid-fire, economical, 1,500 pound BROWN—a car practically as powerful as any 1½ ton truck. The margin of profit is generous and there is no come back from dissatisfied users. A few of the sale clinchers used by BROWN Dealers are found in the following specifications:

INTERNAL GEAR DRIVE

Long Stroke Motor
Center Control
1,500 lbs. Capacity

Tubular Propeller
Unit Power Plant
Internal Gear Rear Axle

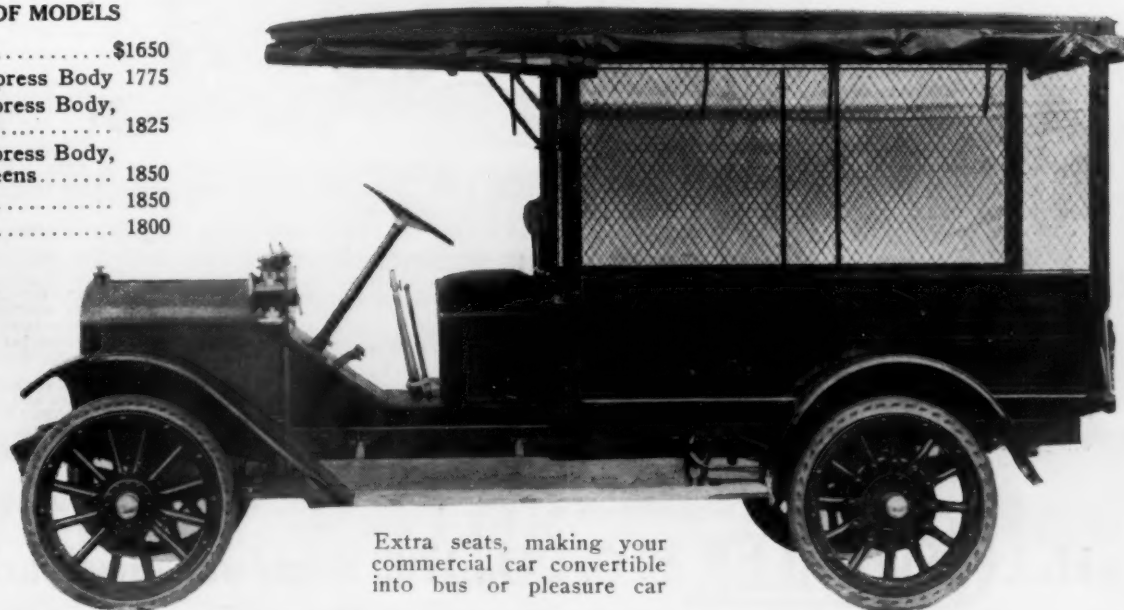
Cushion or Pneumatic Tires
Large Loading Space
122-inch Wheel Base

Write for Dealers' Proposition

The Brown Commercial Car Co., Peru, Ind.
Indianapolis, Office, 450 N. Capitol Avenue

PRICES OF MODELS

Chassis	\$1650
Standard Express Body	1775
Standard Express Body, with Top	1825
Standard Express Body, with Screens	1850
Panel Body	1850
Stake Body	1800



Extra seats, making your
commercial car convertible
into bus or pleasure car

When Writing to Advertisers, Please Mention Motor Age.

KOEHLER COMMERCIAL CAR

CARRYING CAPACITY 1600 ^{LBS.} PRICE \$750.

EFFICIENCY

THERE AND BACK QUICKLY AND CHEAPLY

Isn't that the **BIG THING** you want in a Delivery Wagon?
Light, but Strong Construction = Simple, yet Powerful Motor

You can't beat it! The KOEHLER is without a rival in the delivery wagon field. In fact it is the delivery wagon field. Merchants and dealers everywhere now realize that "KOEHLER" means "EFFICIENT DELIVERY."



Large and roomy. Inside measurements, 44 inches wide, 84 inches back of driver's seat to rear. Flare-boards, 17 inches above floor. **CAPACITY**, 1600 lbs. **PRICE**, \$750. Strongly ironed throughout, also ironed to receive four-post canvas top, which can be had from stock at \$40 additional.

LOOK AT THE SPECIFICATIONS

MOTOR—2 cylinder opposed, 22-24 H. P. Lubrication mechanical and integral with motor; 300 miles one supply of oil; Model L Schebler carburetor.
COOLING—Thermo-siphon system.
IGNITION—Bosch High-Tension Magneto. No batteries or coil needed.
CONTROL—Left-hand, throttle lever, on steering column.
DRIVE—Direct line double universal joint with jack shaft. Final drive from jack shaft

to rear wheel sprocket through double side chains.
TRANSMISSION—Planetary type. All gears genuine chrome nickel steel, hardened throughout.
BRAKES—Service brakes on jack shaft. Emergency brakes simple in design, extraordinarily powerful, operated independently.
TIRES—2½ in. Solid Rubber motor tires.
TREAD—58 in.
CAPACITY—1,600 lbs.

WHEEL BASE—87 in. Wheel—36 in. front and rear, with artillery wheels and hubs, fitted with demountable rims.
SPEED—4 to 16 miles per hour.
PRICE—\$750 to \$900, depending on body equipment.
OIL TIGHT CASE—In which transmission, differential, bevel gears and metal to metal clutch runs in a **CONSTANT OIL BATH**. 1,000 miles with one supply of oil.

Address all correspondence to

H. J. KOEHLER S. G. CO., 1709 Broadway, New York, N. Y.

THE MOTOKART

WATER-COOLED
ENGINE
NO GEARS TO
STRIP



EASY SPRING
SUSPENSION
PRESSED-STEEL
FRAME

500 Lbs. Capacity \$400

THE FIRST REAL DELIVERY CAR AT ANYWHERE NEAR THIS PRICE

The Motokart solves the problem of city delivery. Enough carrying capacity to take care of 90% of all merchandise. Plenty of power to take any stiff grade. Small wheel base and tread, facilitating handling in congested traffic. Built fool-proof, with friction transmission, so that any boy can handle it.

Costs about \$2.00 a day including driver and will do the work of three teams—the Motokart never gets tired, it is just as fresh and full of energy at the end of the day as it was in the morning.

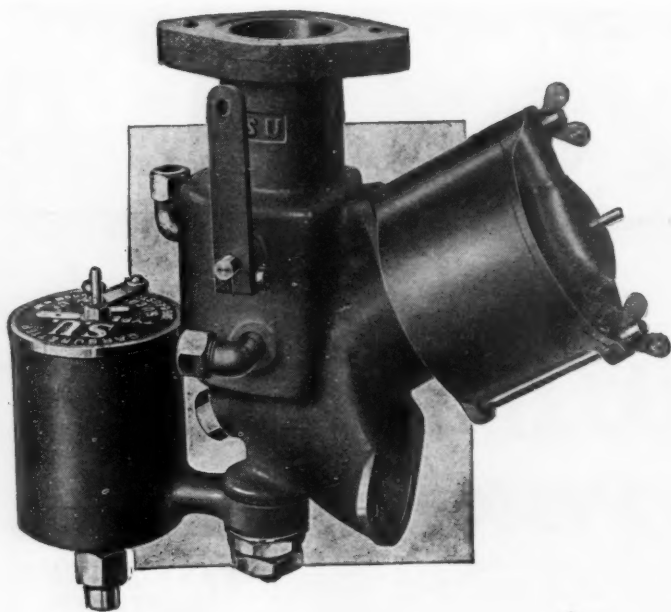
It is the biggest proposition ever put before the Dealer. Just figure out how many prospects there are in your vicinity who need a commercial car and who can afford its small price. Just put up saving to them in dollars and cents on their present delivery and show them how they can even enlarge their business by being able to cover a greater area. It is the quickest selling proposition on the market. Better wire us before someone else snaps it up. Remember, there are a whole lot of dealers writing today and one of them may be in your town.

Address the New York Office

TARRYTOWN MOTOR CAR CO., INC.

FACTORY—TARRYTOWN, N. Y. NEW YORK OFFICE—1790 BROADWAY

When Writing to Advertisers, Please Mention Motor Age.



How the S. U. is operated

THE air space surrounding the gasoline jet is automatically increased or decreased according to the requirement of the engine. The weighted piston in the bellows-chamber of the carburetor acts as a shutter and rises or falls as the engine speed varies. When running at very low speed, the piston is shut down, the air intake being sufficient to properly vaporize the gas. At high speed, the piston rises to its full extent, allowing a very large intake for the air, avoiding undue back pressure in the cylinder and making exceptionally high engine speeds possible. The action being effected automatically entirely by the suction of the engine, the rise of the piston is always in accordance with the engines demand—hence it is impossible to choke your carburetor with gas. The gas supply is governed by the needle attached to the piston—the higher the piston rises the more gas is emitted.

The only really fool-proof Carburetor is the S. U.

NO need to change, or adjust, or monkey with the S. U. in an effort to meet changing weather conditions. The S. U. is a carburetor that meets these conditions perfectly itself. It is wonderfully simple in construction and absolutely automatic in operation, supplying a perfect economical mixture at any engine speed and continues to do so indefinitely without attention.

The S. U. has only one moving part, the piston, which does not touch the walls of the carburetor proper and which *cannot stick*. The needle does not touch the sides of the jet so *cannot wear*. Water-jacketed for hot water circulation.

The cheaper fuels, such as heavier grades of gasoline, which with many carburetors are impossible, can be used to advantage with the S. U., often giving more power without adjustment of any kind, and without any excessive cylinder deposit.

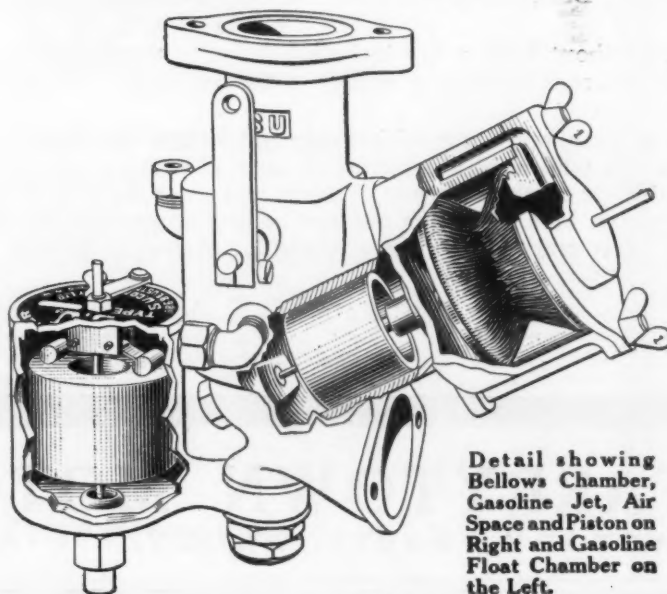
For silence, flexibility, reliability, economy, power, and absolutely fool-proof construction, it will pay you to have the S. U. on your car.

Will you afford us the opportunity of giving you an S. U. demonstration?

THE SIMMS MAGNETO CO.

U. S. Rubber Building
NEW YORK CITY

Factory: Bloomfield
NEW JERSEY



Detail showing Bellows Chamber, Gasoline Jet, Air Space and Piston on Right and Gasoline Float Chamber on the Left.



\$5,000.00

In Cash Prizes

The Ajax-Grieb Rubber Co. offers to Licensed Chauffeurs
208 Cash Prizes for the Greatest Mileage Beyond
5000 Miles Obtained Between April 1,
1913, and March 31, 1914, on

AJAX TIRES

1 Prize	\$500.00	10 Prizes of	\$50.00
1 Prize	300.00	40 Prizes of	25.00
1 Prize	200.00	50 Prizes of	20.00
5 Prizes of	100.00	100 Prizes of	10.00

208 Prizes, \$5,000

In case of ties prizes will be divided equally among tying contestants.

To the Chauffeur:

Every Ajax tire for the past eight years has been guaranteed in writing, for 5000 miles. But 5000 miles should be the minimum mileage, providing you give your tires the same care and attention you give to the mechanism of your car.

Guard against improper inflation, cuts, bruises, running in car tracks. Use the throttle more and the brakes less, and you'll save both tires and machine.

To the Car Owner:

Three-fourths of all tires come to an untimely end through lack of proper care.

It is to ensure you against carelessness and to avoid abuse and neglect that prompts us to make this offer.

Our compensation will come in the satisfaction which every Ajax tire will give, with an added reward in the continued patronage of the satisfied owner.

While Others Are Claiming Quality We Are Guaranteeing It

How to Enter:

It costs nothing to enter the Ajax Mileage Contest. The only requirements are that you car be equipped with one or more Ajax tires (guaranteed for 5000 miles) and that you will fill out a separate regulation entry blank, signed by your employer, obtainable from any Ajax Branch or Dealer, for each individual Ajax tire. Enter now and take advantage of the full time allotted to the contest. Address Contest Department.

AJAX-GRIEB RUBBER CO.

Contest Department C.

Brooklyn—1182 Bedford Ave.
Boston—1084 Boylston St.
Philadelphia—316 No. Broad St.
Atlanta—48 Auburn Ave.
Dallas—1513 Jackson St.

AJAX BRANCHES

Detroit—507 Woodward Ave.
Chicago—18th St. & Mich. Ave.
Cleveland—18th and Euclid Ave.
Kansas City—1606 Grand Ave.
Minneapolis—905 First Ave.

1796 Broadway, New York

Seattle—917 East Pike St.
Denver—1518 Broadway
SAN FRANCISCO—GOLDEN GATE AND VAN NESS AVE.
Los Angeles—1229 S. Olive St.
Portland, Ore.—329 Ankeny St.

DEALERS IN PRINCIPAL CITIES



A Big Car at a Small Car Price

THE R-C-H is the car that meets the needs of the most people because it is a *big* car at a low price. The R-C-H is *big* throughout. There is a *big*, powerful, long-stroke motor; there is a *big*, roomy, English type body; there is a *big* wheel base; the springs are *big*; the tires and the cushions are *big*. The R-C-H is not a small car built to sell at a small price. It carries five passengers with all the comfort the same number would enjoy in a \$5000 car.

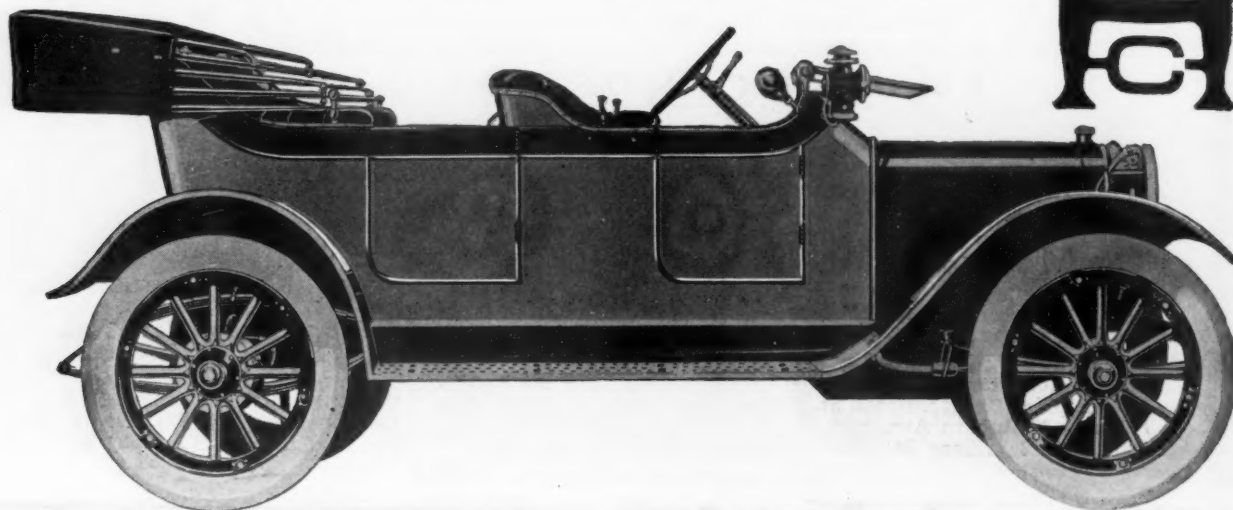
The only thing about the R-C-H which is small is the up-keep cost. You can operate an R-C-H for less than one cent per mile for fuel.

To buy a car of equal size, strength, power, and general roominess under any other nameplate, you will have to pay \$1200.

Write or wire us at once if you wish delivery before summer. Dealers declare the R-C-H the liveliest selling proposition of the season.

R-C-H Corporation

101 Lycaste Street, Detroit, Michigan, U. S. A.



THE CAR

Wheelbase—110 inches.

Tires—32x8½.

Motor—Long-stroke, four cylinders cast en bloc; 3¼ in. bore, 5 inch stroke. Two-bearing crankshaft. Timing gears and valves enclosed. Three-point suspension.

Steering—Left Side. Irreversible worm gear, 16 in. steering wheel. Throttle control on steering column.

Control—Center Lever operated through H-plate integral with universal joint housing just below; Hand lever emergency brake at driver's right. Foot accelerator in connection with hand throttle.

Springs — Front, semi-elliptic. Rear, full elliptic and mounted on swivel seats.

Frame—Pressed steel channel.

Axles—Front, I-beam, drop-forged; rear, semi-floating type.

Transmission — Three speeds forward and reverse; sliding gear; selective type.

Construction — Drop-forgings wherever practicable; chrome nickel steel used throughout all shafts and gears in the transmission and rear axle; high carbon manganese steel in all parts requiring special stiffness.

Bodies—Touring car, full five-passenger. English type; extra wide seats. Roadster, two passenger, English type. Color option: dark Russian green or R-C-H red.

EQUIPMENT

Option of all-electric system with five latest type powerful lamps, or large gas head lights with Prest-O-Lite tank or generator and oil side and tail lamps. Bosch high tension magneto; Stewart speedometer; demountable rims; extra rim and holder; tally-ho horn; Jiffy curtains—up or down instantaneously; top and top cover-windshield; tool kit, jack, tire repair kit; pump; robe rail. With roadster: 25 gallon gasoline tank, big baggage trunk and tire holder.



"I Just Move That Switch"

It's the Simplest Thing You Ever Saw"



The A-B Entz Starting and Lighting System

"All I do is move that switch when I get in. The starter starts the engine every time and *keeps it going*—it can't stall.

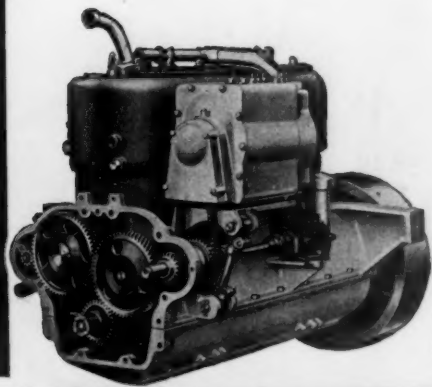
Then as long as the car is running the storage battery is being charged so I always have current enough for the starter and all the lights.

And the beauty of it is I don't have to touch a thing—just drive the car and let the system do the rest.

The dealer recommended this starter to us. He says it requires less care than any system that comes into his garage.

Be sure you get this system on your new car—it has made driving a pleasure for me.

Write for their booklet anyway."



We manufacture under one guarantee the most complete line of electrical accessories made by any firm, including in addition to the above:

- "A-B Double Unit System for Starting and Lighting"
- "AbAutoLites—Scientific Lights for Automobiles"
- "The A-B Trumpet—The Stop-Look-Listen Horn"
- "A-B Switches"

There is a distinctive advantage in having all your electrical equipment guaranteed by one reputable manufacturer.

The Adams-Bagnall Electric Company
Cleveland, Ohio

NEW YORK SYRACUSE PITTSBURGH ATLANTA CHICAGO
BALTIMORE PHILADELPHIA ST. LOUIS BOSTON
R. E. T. Pringle, Canadian Representative, Toronto, Montreal, Winnipeg, Vancouver.

The Modern Way is the **WARD LEONARD** *Way~*

The efficiency of any electric lighting and starting system depends solely upon its ability to maintain an even and constant charge in the battery under all sorts of operating conditions.

The primitive types of electric lighting and starting systems make no pretense at control of the electric charge. Their inefficiency is plainly apparent.

The ordinary types of electric lighting and starting systems now on the market are mechanically controlled—a slipping clutch—centrifugal governor—or other device.

Every electrical engineer knows that it is impossible to regulate the charge of the battery for long life by any mechanical means. This type will work well for a time—but when the parts friction and wear by usage, then trouble begins.

It is an impossibility to charge the battery at an improper rate with the WARD LEONARD SYSTEM. An automatic electric switch gives infallibly accurate control, regardless of the speed of the motor.

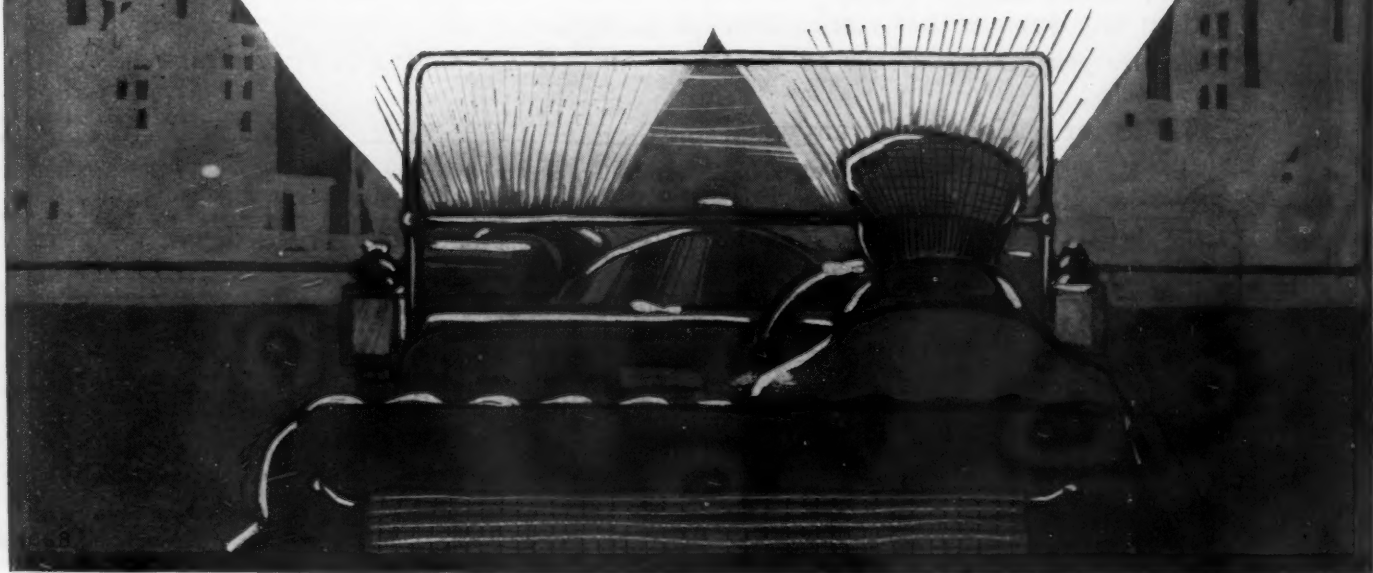
That you would buy the primitive type is out of the question; that the ordinary types are inaccurate are proved by the hundreds of cars which were equipped with them, and which are being returned to the factories.

The automatic control of the dynamo in the WARD LEONARD SYSTEM has solved the problem of efficient lighting and starting. The WARD LEONARD SYSTEM is a commercial and scientific success.

Write for our literature.

The Ward Leonard Electric Co.

Bronxville, New York



When Writing to Advertisers, Please Mention Motor Age.

AMERICAN
UNDERSLUNG

The Most Strikingly Different 1914 "Sixes"

THE American Underslung "Sixes" for 1914 are "Sixes" which lend an emphatic conviction of fashionable connection and association. Every line is a line of distinction; every curve is a curve of grace. You have the greatest strength, power and comfort, the most striking beauty and the most alluring charm builded into the very newest and best in "Sixes."

These are the "Sixes" for those who seek that illusive atmosphere of individuality. Abundant in strength, unrivalled in power, they speed over the highway with a cushion-like riding resiliency. There is never an unpleasant vibration, quiver, jolting, or jar—just the soothing, purring response of the truly flexible and ideal "Six."



Type 644—\$2750

When Writing to Advertisers, Please Mention Motor Age.

AMERICAN

UNDERSLUNG

IN the action of the American Underslung "Six" for 1914, there is that mechanical eagerness so much desired. The big, powerful and practical long-stroke motor is as responsive at four miles as at sixty. The valves, enclosed with aluminum according to best European practice, are practically silent; there is audible only that crooning, satisfying harmony of six flexible cylinders.

It is economical of gasoline, and completely obedient to the demands of the most improved four speed transmission. This transmission is of Chrome Vanadium steel, with imported annular bearings, an absolute guarantee of the much-discussed, much-sought-after and much-needed "Six" quality, flexibility. Four speeds are characteristic of a "Six;" it cannot be a true "Six" without them.

Next to a big, powerful, flexible motor equipped with a four speed transmission, there is nothing so conducive to touring satisfaction as big springs, a long wheel base, big wheels and large diameter, over-sized tires.

The American Underslung "Six" design does not limit the length of wheel base,

wheel size, tire size, spring size; it does not curtail comfort as an overhung "Six" must—but increases it ten fold.

Examine the springs on these 1914 American Underslung "Sixes." They are suspended to secure the very maximum of comfort—40 inches long in front and 54 inches long in the rear. To make them even more resilient we build them of the most expensive silico manganese steel.

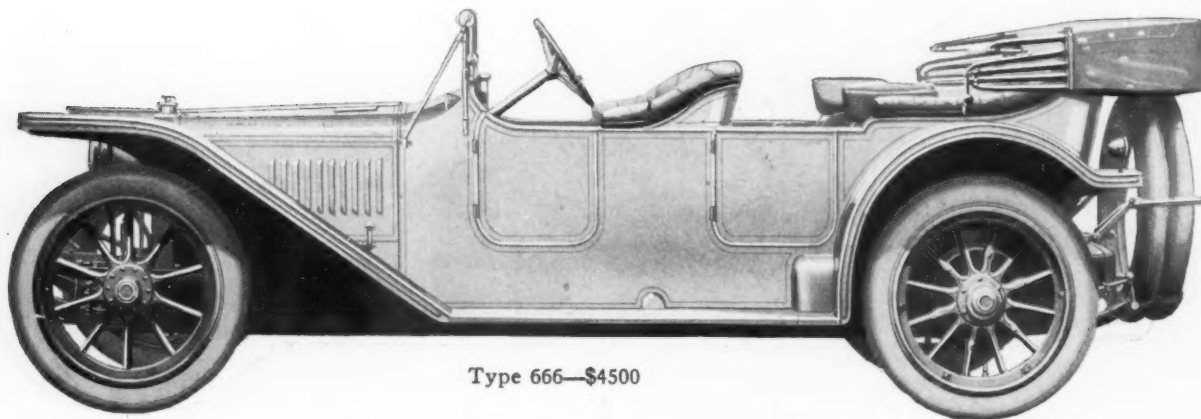
The American Underslung "Six" 39 x 5-inch tires are the largest sized tires practical. Such sized tires have a contact surface nearly 30 per cent greater than the average tire. The greater the contact surface, the less the wear on tires. Tire makers declare 70 to 80 per cent of all tire wear to be due to "slippage" on undersized tires.

SIX CYLINDERS—SIX PASSENGER—(TYPE 666)

Motor $4\frac{1}{2} \times 6$ inches; 140-inch wheel base; 39 x 5 inch tires; four-speed transmission; positive electrical starting and lighting outfit; high-tension ignition (dual system).

Regular equipment includes full electrical outfit, 100-mile Warner speedometer and clock, plate-glass windshield, mohair top and storm curtains, electric horn, shock absorbers, two extra demountable rims. Colors optional.

Price f. o. b. Indianapolis \$4,500



Type 666—\$4500

When Writing to Advertisers, Please Mention Motor Age.

AMERICAN

UNDERSLUNG

ON the road you are assured of "American Underslung" safety. The Underslung frame lowers the center of gravity 8.3 inches; holds the speedy "Six" to the road and divides the strains equally. General chassis wear is diminished and a tremendous saving in power, gasoline and oil is effected by the powerful straight line drive.

Ninety-six per cent of the motor power reaches the rear system; twenty per cent is not wasted as in an overhung "Six."

And the American Underslung "Six" rear axle is of the most practical, powerful and accessible construction. It is of the full floating type, built-up with pressed steel sleeves and torsion tube. The differential housing is of high grade crucible steel; the differential may be removed without complications, by the lifting of one plate. The American Underslung "Six" rear system is built to conserve and to utilize to the fullest extent the enormous power of the motor.

Point after point of these new "Sixes" must appeal to your sense of values; there is an attention to detail not found outside of the highest priced "Sixes." For instance, we

use a double thrust-bearing in the front wheels. There is not another "Six" listing at less than \$5000 in which such a precaution is taken against wear and tear.

Realizing that no 1914 car is better than its starting and lighting system, we have built in, as an integral part, the very highest type of lighting and starting equipment. Clean, compact and certain, it permits of a centralized control at the driver's seat which is unexcelled. Built-in, built especially for us, it is a permanent apparatus which will never tend to decrease your car's value this year or next.

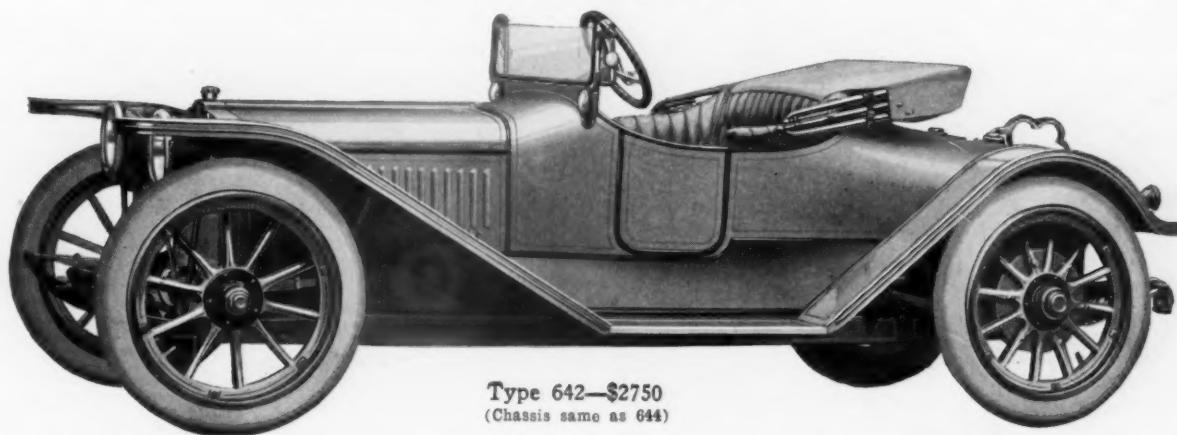
Such is the guarantee of riding comfort and charm in an American Underslung "Six." No mechanical worry, and a magical elimination of all road shocks by the big wheels, big tires, big springs, and big wheel base.

SIX CYLINDERS—FOUR PASSENGER—(TYPE 644)

Motor 4 x 6 inches; 132-inch wheel base; 38 x 4½-inch tires; four-speed transmission; positive electric starting and lighting; high tension ignition (dual system).

Regular equipment includes full electrical outfit, 60-mile Warner speedometer and clock, plate-glass windshield, mohair top and storm curtains, electric horn, shock absorbers, one extra Q. D. demountable rim. Color options, French grey or coach blue. TYPE 642—two passenger body on same chassis.

Price f. o. b. Indianapolis \$2,750



Type 642—\$2750
(Chassis same as 644)

When Writing to Advertisers, Please Mention Motor Age.

AMERICAN UNDERSLUNG

All The Big Underslung Qualities in a Stylish "Four"

Right along with these new 1914 "Sixes" we will continue the manufacture of the long famous American Underslung small car—Type 422.

This car is a little edition de luxe of all the big and attractive qualities of American Underslung construction. It is probably the most commented on small car ever produced.

There is no other small car as distinctive, stylish and exclusive in appearance; there is no other small car as luxuriously upholstered and magnificently finished; there is no other small car with the power, speed and strength of this little underslung beauty; there is no other small car with as expensive, high grade accessory equipment.

Type 422 is self-starting and electrically lighted; it is a fit mate throughout for the big American Underslung "Sixes."

Dealers: Here is a line of 1914 types with specifications up to the very last minute. Both "Six" and "Four" types are included. If you sign up with us you will have a big uninterrupted season of sales. Wire us territory wanted, at once; it may still be open.

Please Address Dept.-H.

American Motors Company
Indianapolis, Indiana

FOUR CYLINDER

TWO PASSENGER (TYPE 422)

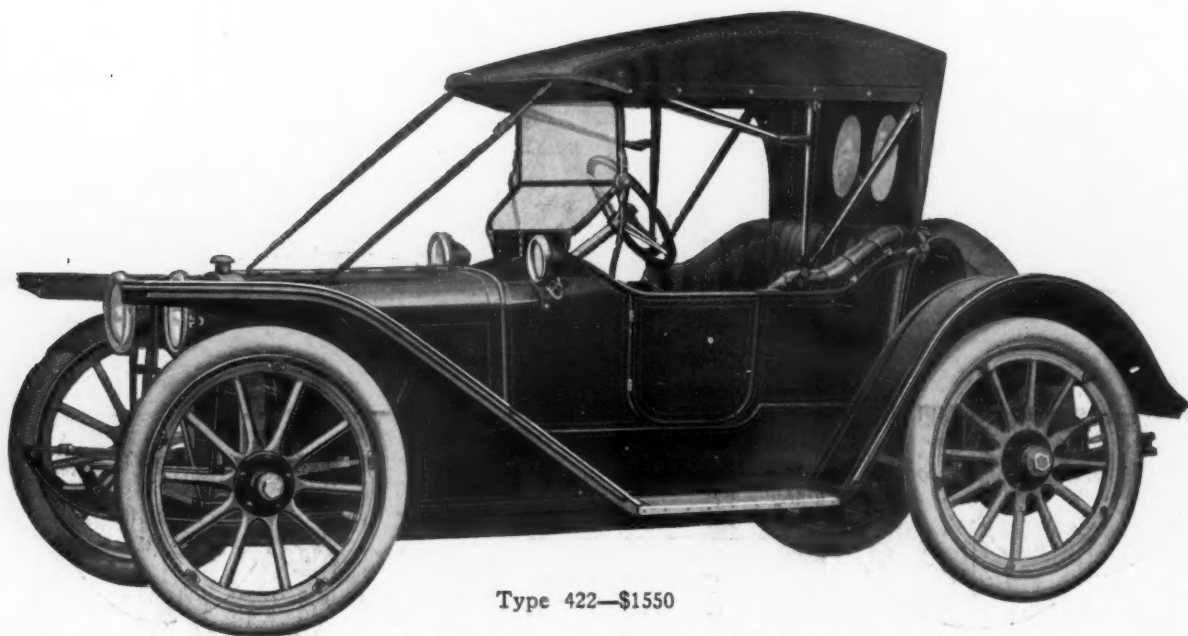
Motor 4 x 5 inches; 105-inch wheel base; 36 x 3½-inch tires, three-speed transmission; positive air-starter and electric lighting; high-tension ignition (dual system).

Regular equipment includes positive air-starter, complete electrical outfit, 60-mile Warner speedometer, plate-glass windshield, mohair top and curtains, one extra demountable rim, horn, jack and tool set. Color, "American" wine, black fenders. Price, f. o. b. Indianapolis,

\$1,550

*Write today for
this Literature*

Interesting and handsomely illustrated books on these new "American Underslung" types and on the many advantages of underslung construction in motor cars will be sent on request.



Type 422—\$1550

When Writing to Advertisers, Please Mention Motor Age.



The Patriarch of the Pool

This is the second of the Hupmobile week-end paintings which are giving a new and distinctive tone to the Hupmobile's national advertising—the depiction of a sales-idea each of our dealers can well adapt to his own work

How We Work With Our Dealers To Increase Their Sales

Hupmobile

HUPMOBILE "32" ROADSTER

\$1,000 f. o. b. Detroit.

Four-cylinder motor, cylinders 3 1/4-inch bore by 5 1/2-inch stroke, cast en bloc. Unit power plant.

Selective type transmission, sliding gears.

Irreversible screw and double nut steering gear.

Full-floating rear axle.

Twelve by two-inch brakes, external contracting and internal expanding.

Wheelbase, 106 inches.

Tires, 32 x 3 1/2 inches.

Equipment of windshield, mohair top with envelope, Jiffy curtains, speedometer, quick detachable rims, rear shock absorber, gas headlights, Prest-O-Lite tank, oil lamps, tools and horn.

Finish, black with nickel trimmings.

"32" Six-pas., fully equipped...\$1200

"32" Touring car, fully equipped...\$1000

"32" Delivery, fully equipped...\$1100

"20" H. P. Runabout...\$ 750

All Prices F. O. B. Detroit

"32" Touring Car, fully equipped...\$1180

"32" Six-Passenger Touring Car, fully equipped...\$1430

"32" Roadster, fully equipped...\$1180

"32" Delivery, fully equipped, without speedometer...\$1300

"20" H. P. Runabout, fully equipped...\$ 850

All Prices F. O. B. Windsor, Can.

We believe that our ideas of marketing motor cars are the most effective for the dealer out in the field.

Our policy provides sales-help for the dealer.

Our aim is to make him a better salesman—

To put him in position to make more sales; and to close them with less effort, and consequently less expense, which means greater net profit at the year's end.

These are the things every motor car dealer is striving for.

These are the things we are helping the Hupmobile dealer to accomplish.

We do it by giving him a car that has made a reputation for quality and service and economy—a car which, by daily verifying our oft-expressed belief that the Hupmo-

bile, in its class, is the best car in the world, has actually placed itself beyond competition.

We go farther than that, with powerful national advertising that reaches every nook and cranny of the country, with farm paper and daily newspaper advertising.

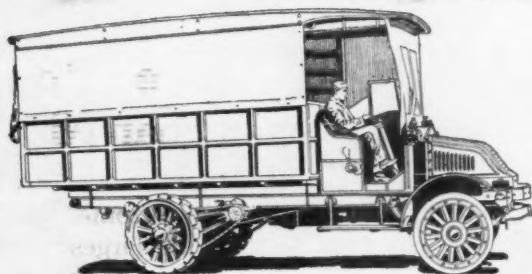
We go farther than that, with direct sales-suggestions to the individual dealer and his men; and with a house organ that has a definite value from the sales standpoint.

A man can sell a car without this advice and aid; but he can sell the same number with less effort and expense or a greater number with the same effort and expense, if he has the benefit of it.

We believe that these things are the dealer's due; so the Hupmobile dealer has the advantage of them, to the end that he shall do a better and a bigger business at a greater profit.

HUPP MOTOR CAR CO., 1228 Milwaukee Ave., Detroit, Mich.

When Writing to Advertisers, Please Mention Motor Age.



We Will Help YOU Sell Kelly Trucks

Our sales and advertising department is designed primarily to sell Kelly Trucks for our dealers. We will help you in every possible way.

This means that we will help you by aggressive advertising, intelligent publicity and direct sales co-operation.

A large appropriation will be spent in advertising and sales promotion work this year.

Every member of our sales and advertising department has had long experience in selling. They know how to help you sell trucks—they can sell trucks for you.

This co-operation is *real*.

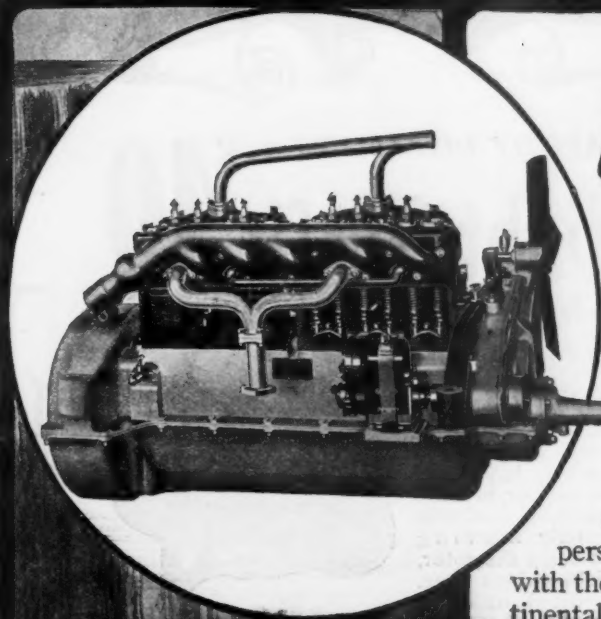
KELLY TRUCKS

We want you as our agent in your territory. We are willing to meet you more than half way. A word from you will start something NOW.

THE KELLY-SPRINGFIELD MOTOR TRUCK COMPANY

804 Burt Street, Springfield, Ohio





Continental

**3,000,000 Horse Power
Six Times Greater Than Niagara**

Great as we consider Niagara, huge as its present half million horse power output seems to the average person yet in comparison with the energy of 75,000 Continental motors in active, daily service—it is small.

More than fifty manufacturers in the motor industry use Continental power—keen, far-seeing business men who are building reputations for the struggle to survive.

No quick decisions, no guess-work appeal to them. Cold investigation of motor worth, exhaustive tests, careful balancing of motor reputations before the verdict is handed down of—Continental.

Why?—Because it is America's

standard automobile engine made by the largest exclusive motor builders in the world.

It is approved by the motor vehicle buyer and is a big sales asset.

It is the result of ten years efforts in motor specialization and has *made* many successful motor vehicles.

The manufacturer can buy a better motor in the Continental for less money than he could build himself.

These reasons have *convinced*. And 75,000 of these famous motors in successful service furnish proof of Continental dominance in the trade.

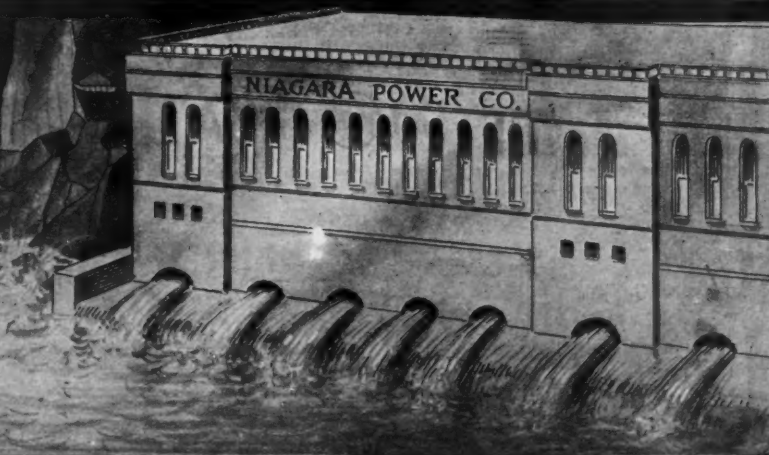
A Continental in the chassis inspires confidence—the key-stone of successful business.

**Use this confidence in the Continental
for your profit and protection.**

Continental Motor Mfg. Co.

Detroit, Michigan

Factories—Detroit and Muskegon, Michigan



BRING YOUR OLD CAR UP TO DATE BY INSTALLING A \$



Electric Headlight Outfit 40

Complete Outfit—Electric Generator, Headlamps, Switch Wire and Bulbs

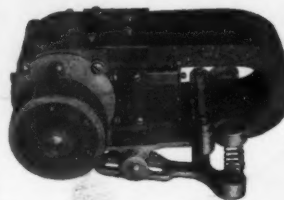


HEAD LAMPS

are handsome and made from one piece drawn from steel dies, have no soldered joints and are easy to polish. No extra charge for black finish. The Reflectors are set in the door against a felt ring to keep out dust and moisture. They are made of correctly formed brass, heavily silvered and highly polished on the reflecting surface. Lamps alone, \$15 and \$17.

GENERATOR

embodies the well-known K-W construction, having no commutator, brushes or sliding contacts, the only moving part being the rotor, which swings free, supported on high duty ball bearings. Generator weighs but 18 lbs. Compare it with the heavy, complicated and costly charging outfits. If you have Electric Head Lamps get the K-W Electric Generator, only \$25. Can be used for ignition in connection with timer and spark coil.



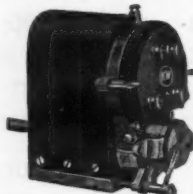
EASY TO INSTALL on any car having exposed flywheel or other place to belt or friction drive the generator.

The K-W High Tension Magneto

For all cars having provision for Magneto

High Tension Magneto are for Ignition only. Use Low Tension for Lights. If you cannot gear-drive a High-Tension Magneto, use one of our Low Tension belt or friction-drive Magneto and a K-W Spark Coil. Write for details.

Model J
Guaranteed
to Start
Auto
Engines up
to 30 H. P.



No Coil
No Timer
No Batteries
4 Cyl., \$50
6 Cyl., \$55

We make larger Magneto for larger engines.

K-W FORD ELECTRIC HEADLIGHT OUTFIT, \$15

FOR CARS WITH FLYWHEEL MAGNETO

The successor to the gas tank. The most successful electric headlight outfit for Ford cars; because it is especially designed and engineered to work in connection with the Ford Flywheel Magneto.

Send for descriptive folder

Why the



Master Vibrator?

Because It Will Positively Give You



A Hotter Spark
A Smoother Running Engine
Easier Starting

More Power
Less Carbon Deposits
Cleaner Spark Plugs

Over 38000 Ford Owners Have Installed Them

And more are doing so every day. Watch the number grow monthly. OUR GUARANTEE: Try the K-W Master Vibrator for 30 days and if you can get along without it return it and we will send your money back and ask no questions. Send for descriptive folder.

Get  and That **SATISFIED FEELING**

Price \$15

WE PREPAY THE EXPRESS all the way on the K-W Master Vibrator and East of the Mississippi on all our other goods when cash accompanies the order.



Be sure to give
street number

2835 Chester
Ave.

Agents in all Principal Cities: New York, E. J. Edmond, 1783 Broadway; Boston, Walter J. Forbes, 243 Columbus Ave.



Overland

Only American car to finish

ON May 13th, in the famous Targa Florio cup race, 620 miles over the mountainous roads of the Island of Sicily, an Overland was the *only* American car to finish. It defeated famous European machines such as the Renault, Minerva, Isotta and the Lancia.

\$985 Completely Equipped
F. O. B. Toledo

Self-Starter
30 Horsepower
5-Passenger Touring Car

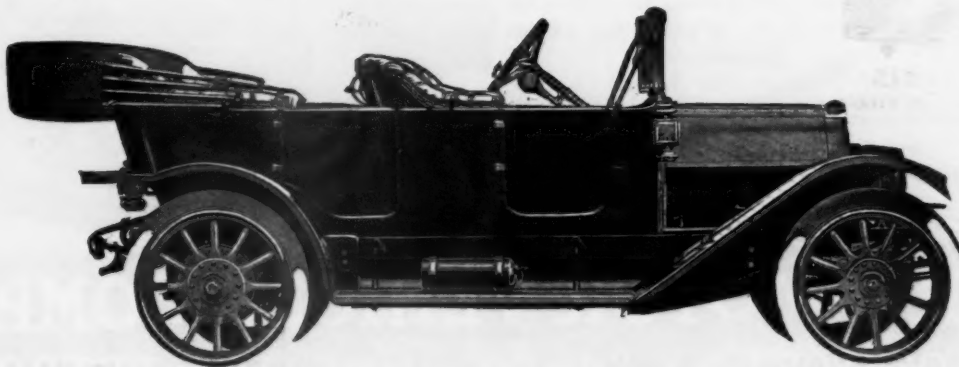
110-inch Wheel Base
Timken Bearings
Center Control

Remy Magneto
Warner Speedometer
Mohair Top and Boot

Clear Vision, Rain Vision
Wind Shield
Prest-O-Lite Tank

Catalogue describing this car on request. Please address Dept. 46

The Willys-Overland Company, Toledo, Ohio



When Writing to Advertisers, Please Mention Motor Age.

25,000 Diamond Dealers

are cashing in on

Diamond {No-Clinch} Tires

made of more-mileage

Vitalized Rubber

also with

No-Pinch Safety Flap

for inner-tube protection—

with

Perfect 3-Point Rim Contact

that holds with a vise-like rim grip, absolutely preventing the tire from breaking above the rim, insuring perfect rim fit and eliminating all rim troubles.

Be a Diamond Dealer

If you are not a Diamond Dealer, now is the time to get in line. There is a Diamond Branch near you—get in touch today.



THE

Special-
ization reaches its
highest development in the
production of the Covert Transmission.

Because we specialize on this one product we can
furnish Covert Transmissions to the car and truck manufacturer
at lower cost than he can build an equally good transmission himself. The
present day buyer of a motor vehicle looks for and appreciates the use of
parts of known reputation and quality. For instance, the recognized standing of
the Covert Transmission adds to the reputation and sales value of any car
on which it is used. Manufacturers who realize this fact add
to the reliability and service value of their cars, at the
same time cutting down production ex-
pense, by adopting the Covert
Transmission.

Our engineers are at the
service of automobile manufac-
turers without charge or obli-
gation. Send your blueprints
or write today for
catalog.

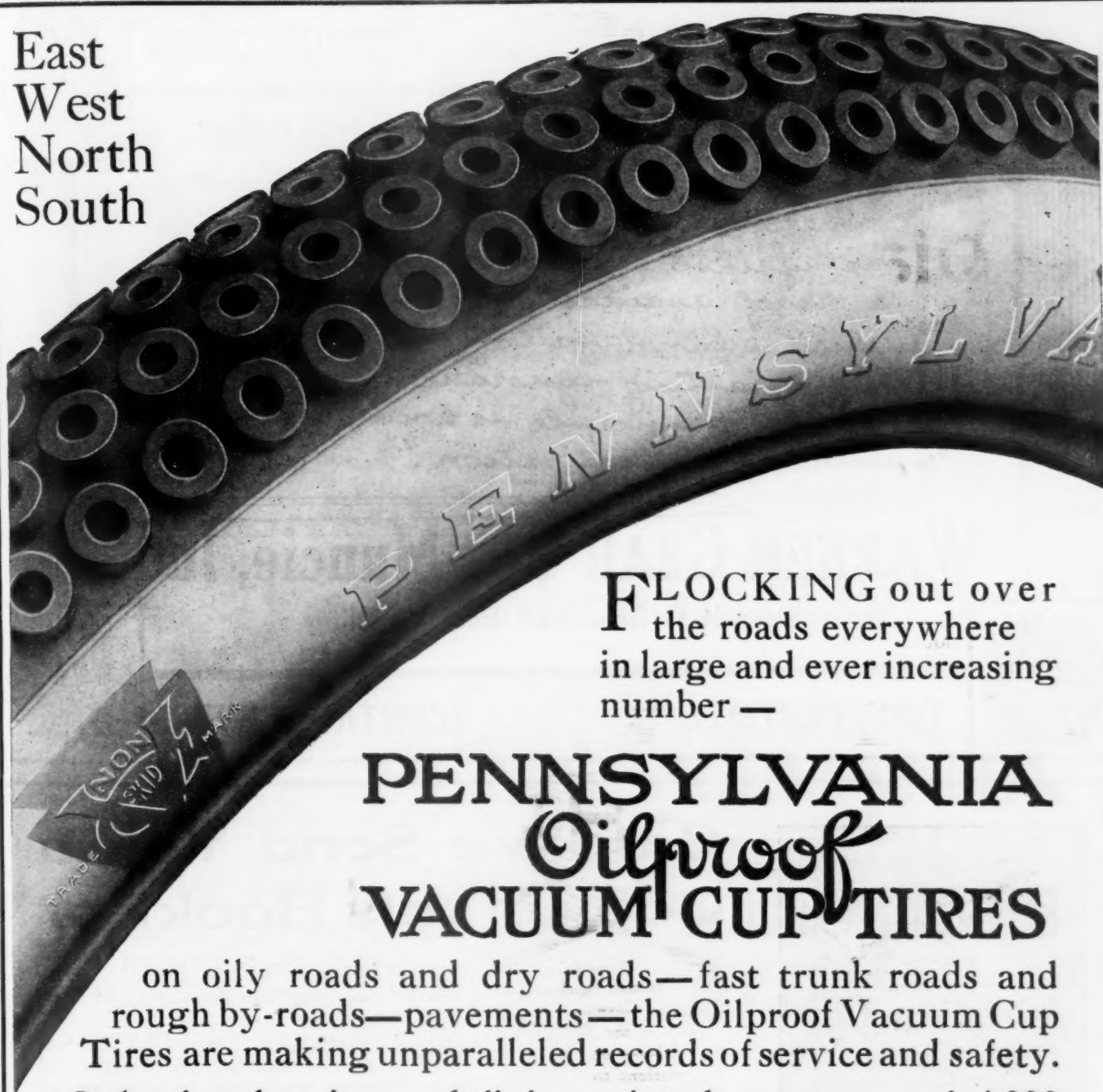


COVERT MOTOR VEHICLE COMPANY

FACTORY: LOCKPORT, N.Y. Sales Office: 1422 Ford Bldg. DETROIT, MICH.

When Writing to Advertisers, Please Mention Motor Age.

East
West
North
South



FLOCKING out over
the roads everywhere
in large and ever increasing
number —

PENNSYLVANIA *Oilproof* VACUUM CUP TIRES

on oily roads and dry roads—fast trunk roads and
rough by-roads—pavements—the Oilproof Vacuum Cup
Tires are making unparalleled records of service and safety.
Only tires bearing a definite printed guarantee of 4,000
miles.

THE VACUUM CUP SMILE IS THE BROADEST IN THE TIRE BUSINESS—WITH
THE DEALER JUST AS MUCH AS WITH HIS VACUUM CUP CUSTOMERS

MORAL: *Make your tire business more pleasant and profitable—V. C.*

Pennsylvania Rubber Co., Jeannette, Pa.

BRANCHES

Pittsburgh, 505 Liberty Ave.	Chicago, 1004 Michigan Ave.	Omaha, 215 S. 20th St.
Cleveland, 1837 Euclid Ave.	Minneapolis, 34 S. 8th St.	Seattle, Armour Building.
Detroit, 254 Jefferson Ave.	Kansas City, Mo., 514 E. 15th	

PENNSYLVANIA RUBBER COMPANY OF NEW YORK		
New York City, 1700 Broadway	Boston, 149 Berkeley St.	Dallas, 411 S. Ervey St.

PENNSYLVANIA RUBBER COMPANY OF CALIFORNIA	
San Francisco, 512-514 Mission Street	Los Angeles, 930 S. Main Street

An Independent Company with an independent selling policy



When Writing to Advertisers, Please Mention Motor Age.



TRANSMISSIONS

STEERING GEARS



"The Value of our Product is not in its Price—But in the Service Rendered"

"There is a principle which is a bar against all information, which is proof against all argument, and which cannot fail to keep a man in everlasting ignorance. This principle is condemnation without investigation."

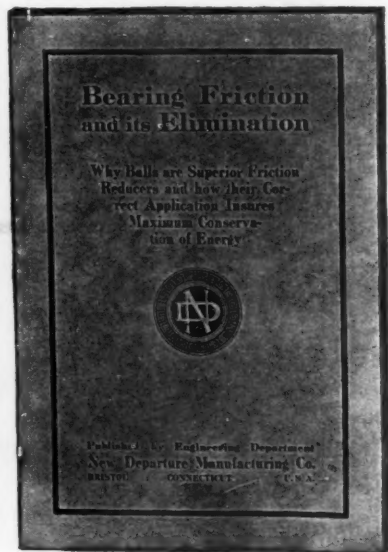
WARNER GEAR CO., Muncie, Ind.

Detroit Office—628 Ford Building



DIFFERENTIALS

CONTROL LEVERS



Can We Send You a Copy of this Booklet?

Our Engineering Department has published the first of a series of booklets discussing the latest developments in the solving of bearing problems.

This first brochure is entitled "Bearing Friction and Its Elimination," and aims to show why balls are superior friction reducers and how their correct application secures maximum conservation of energy.

The types of bearings particularly discussed and compared in this writing are the ball and roller bearings, as applied to all bearing points in the motor car.

It discusses and explains the growing tendency among engineers and manufacturers to favor the ball type of bearing, as evidenced by the summarization figures published by the "Horseless Age" in a review of 1913 pleasure car models. These figures show that ball bearings are used in the differential of 53% of pleasure cars for 1913, as against 37½% of the 1912 models; in the transmission of 75%, as against 64%; and in the rear wheel of 52%, as against 42%.

This brochure will interest you. Copy will be mailed you promptly on request.

WESTERN BRANCH:
1016-17 Ford Building Detroit

The New Departure Manufacturing Company
Bristol, Conn.

KINGSTON

The
MODERN CARBURETOR

Little Drops of Gasoline Make a Mighty Fuel Bill

If you caught a thief in your garage stealing your fuel you would prosecute him. If a garageman sold you gasoline in a short measure, you would forever afterwards deny him your patronage.

Yet thousands of motorists continue to put up with a thieving carburetor—a carburetor that steals not once, but every day in the year—a few drops every time their engines turn over.

It's these few drops wasted that cost and count. They amount to gallons in a year—gallons of 20-cent fuel that might just as profitably have been poured into the road as far as any power derived from them was concerned.

New Model "Y" Handles Any Grade Fuel

THE KINGSTON NEW MODEL "Y" was designed in the knowledge that the high cost of gasoline made economy imperative in a 1913 carburetor. Economy is gained in the KINGSTON by what corresponds to an automatic expanding venturi, and by flood-proof construction. The former makes for a thoroughly saturated mixture under all conditions of load, speed and temperature; the latter prevents waste through "flooding" by means of a specially designed sediment pocket in the gasoline bowl—enables the KINGSTON to handle safely the lowest grades of fuel.



A Right Mixture Automatically Supplied

The KINGSTON auxiliary air supply is automatically taken care of by four floating bronze ball valves—each of which opens under a different motor suction, and supplies an absolutely uniform mixture for its given speed.

In the same measure that a hardened bronze ball cannot change in shape or weight, the delivery of a mixture that is consistently economical cannot change. The invariable accuracy of a ball valve appeals to every motorist's mechanical common sense.

Let us send you other reasons why your Carburetor should be a New Model "Y" KINGSTON. Write us.

Made by the Oldest Manufacturers of Carburetors in America
ESTABLISHED 1895

BYRNE, KINGSTON & COMPANY, Kokomo, Indiana

BRANCHES

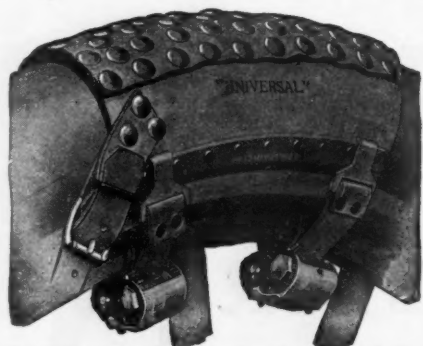
CHICAGO
1430 Michigan Avenue

DETROIT
650 Woodward Avenue

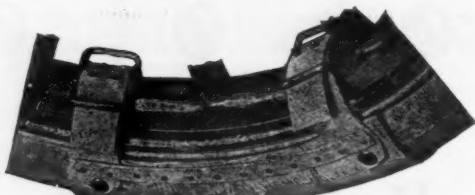
NEW YORK
1733 Broadway

LOS ANGELES
804 So. Olive Street

When Writing to Advertisers, Please Mention Motor Age.



The Universal Ratchet Anchor Quick Repair Boot.



Universal Quick Repair Boot Junior, Adjustable Inflation Boot.



Universal Armored Clincher Boot.

"Universal" Quick Repair

THREE LEADERS; A REAL "QUICK REPAIR" BOOT For Every Emergency, To SUIT EVERY PURSE.
A REAL REPAIR BOOT May cost a little more than "A BLUFF," But is WORTH A LOT MORE WHEN YOU NEED IT.

Big Price Reduction

The "UNIVERSAL" Ratchet Anchor Quick Repair is ON or OFF or ADJUSTED IN A "JIFFY" with the Little Wrench.

"UNIVERSAL" JUNIOR

Is 'Not a Buckle Anchor, but a Padded "FELLOE GRIP." HOOK the PAIRS OF STRAPS up TIGHT, to meet any variation in tire. THAT'S ALL.

"UNIVERSAL" CLINCHER

Steel Side Plates with TWO or THREE Clincher Hooks. Will Hold ANY BLOW-OUT.

Revised Price List, Effective June 1st, 1913

"RA" TYPE Reinforced & Armored Length of Boot

Tire Size	9-in.	12-in.	15-in.
3 in.	\$2.40	\$2.70	\$3.10
3½ in.	2.50	2.85	3.25
4 in.	2.55	2.90	3.35
4½ in.	2.60	2.95	3.45
5 in.	2.65	3.05	3.50

"JUNIOR" TYPE Reinforced & Armored Length of Boot

Tire Size	9-in.	12-in.	15-in.
3 in.	\$1.35	\$1.60	\$1.75
3½ in.	1.45	1.75	2.20
4 in.	1.50	1.80	2.40
4½ in.	1.55	1.90	2.45
5 in.	1.60	2.00	2.60

CLINCHER BOOT Reinforced & Armored Length of Boot

Tire Size	9-in.	12-in.	15-in.
3 in.	\$1.05	\$1.30	\$1.45
3½ in.	1.10	1.50	1.65
4 in.	1.20	1.55	1.75
4½ in.	1.25	1.60	1.85
5 in.	1.30	1.70	1.90

"RA" TYPE Plain Length of Boot

Tire Size	9-in.	12-in.	15-in.
3 in.	\$2.20	\$2.40	\$2.85
3½ in.	2.25	2.50	2.95
4 in.	2.35	2.60	3.10
4½ in.	2.45	2.70	3.20
5 in.	2.50	2.80	3.30

"JUNIOR" TYPE Plain Length of Boot

Tire Size	9-in.	12-in.	15-in.
3 in.	\$1.05	\$1.30	\$1.70
3½ in.	1.10	1.35	1.85
4 in.	1.20	1.50	1.90
4½ in.	1.25	1.55	2.10
5 in.	1.35	1.65	2.20

CLINCHER BOOT Plain Length of Boot

Tire Size	9-in.	12-in.	15-in.
3 in.	\$0.70	\$0.95	\$1.10
3½ in.	.80	1.10	1.20
4 in.	.90	1.20	1.30
4½ in.	.95	1.30	1.40
5 in.	1.00	1.35	1.50

Dealers Get Our Discounts!

Ask your dealer: or we will SEND YOU WHAT YOU WANT.
ANYWHERE, PREPAID, on Receipt of Price.

UNIVERSAL TIRE PROTECTOR CO.,

Dept. M.

Angola, Ind.

SPLITDORF

"Always There"

Reduce the Motoring Tariff

by insisting upon SPLITDORF PLUGS whenever and wherever you find plugs are needed.

"COMMON SENSE" in name—they are common sense in every detail, being gas-tight, soot-proof and unbreakable.

Look for the SPLITDORF trademark stamped on the plug and insist upon the hexagonal porcelain—none others are genuine.

For automobile, motor truck, motorcycle and motorboat—for any engine at any speed—use SPLITDORF PLUGS.

"New ignition for old" is a special exchange proposition of great interest to every owner of a gasoline motor that is not equipped with SPLITDORF up-to-the-minute ignition. Save time and money and write or call for particulars TODAY.



SPLITDORF ELECTRICAL COMPANY

NEW YORK, 18-20 West 63d St.
BOSTON, 180-182 Massachusetts Ave.
PHILADELPHIA, 1338 Cherry St.
KANSAS CITY, 1823 Grand Ave.
CHICAGO, 64-72 E. 14th St.

Factory: Newark, N. J.

DETROIT, 863 Woodward Ave.
ATLANTA, 8 Harris St.
SAN FRANCISCO, 1028 Geary St.
LOS ANGELES, 1228 S. Olive St.
SEATTLE, 1628 Broadway.

LONDON, BUENOS AIRES.

When Writing to Advertisers, Please Mention Motor Age.

EQUIP YOUR CAR WITH A "PRESTO" ELECTRIC CIGAR LIGHTER ELECTRIC REPAIR LAMP ACETYLENE LAMP LIGHTER 3 in 1



Price
\$2.50

"Presto"
Lighter
only.
Showing
operation
of holder

When you want to smoke, simply press the larger button and light a cigar or cigarette. Wind, speed or weather makes no difference. No stopping to light up. New design, handle of Rosewood finish, nickel plated reflector, pure platinum cigar lighter tip. Polished ivory finish push buttons—a handy exploring lamp. It is six volt electric-furnished with 10 feet silk cord, absolutely safe, no danger of fire.

No striking matches or removing side lights. The "Presto" is always at your elbow and within easy reach of everyone in the car. Durable, economical and efficient. Adapted to automobiles, electric vehicles, electric and gasoline launches.

Price complete..... \$3.50

PRESTO CIGAR LIGHTER ONLY

A boon to the smoker—just press the button—light your cigar going at any speed—no wind too strong to bother. Well made, handle and parts same as above—neat and attractive—nothing to get out of order. Pure platinum cigar lighter tip and with 10 feet of silk cord.

Price complete..... \$2.50

Cut shows a highly polished holder which can be placed on dash, in the tonneau or any other convenient place in the car. Price..... 25c

Buy of your dealer or sent prepaid upon receipt of price

SOLE MANUFACTURERS

METAL SPECIALTIES MFG. CO.

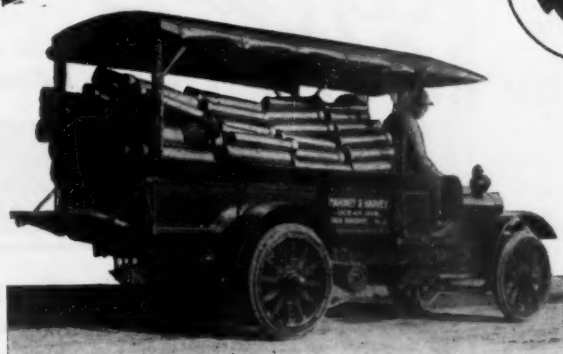
736 W. Monroe Street,

Chicago, Ill.



Price
\$3.50

"Presto"
Cigar
Lighter
and
Repair
Lamp
Combined



Our unbounded confidence in

The Selden Truck

is evidenced by the fact that we are selling it

On the Time Payment Plan

We are pioneers in the movement to put the motor truck on the same basis with other business necessities and to sell it upon terms that make it easy for the average merchant and manufacturer to purchase.

The SELDEN TRUCK is built to provide each purchaser with a safe and profitable investment. That is why it is the sturdiest and best one ton truck ever produced.

The truck purchaser who takes advantage of our sales plan has a chance to try out his truck in actual service while it is earning its own payment.

\$500 in cash covers the initial payment on The Selden Truck and the purchaser is granted a whole year in which to pay the balance.

Agents with first class sales and service
facilities wanted in unassigned territory

Selden Truck Sales Company

256 East Avenue

Rochester, N. Y.

THE BROWN IMPULSE TIRE PUMP



Throw Away Your Old Hand Pump

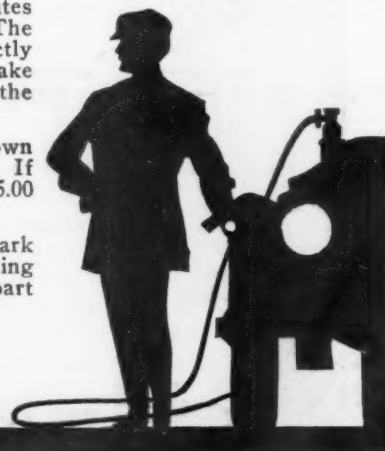
It has always been a nuisance. You have strained, fumed and sweated trying to inflate your tires with it, and it never gave you proper inflation. It has cost you money because tires must be inflated to the right pressure if you want them to give service and satisfaction.

Get a BROWN IMPULSE TIRE PUMP and Let Your Motor Do the Work

It's very easy to use a Brown. Just lift out the special B'Co Spark Plug and insert the pump. Your two hands do the work in thirty seconds. No wrench required. Two to four minutes fills your tire with pure cool air. The gauge tells you when you have exactly the right pressure. If you want to make tire inflation a pleasure, to lengthen the life of your tires, use a Brown.

Ask your dealer today about the Brown Impulse Tire Pump. He can tell you. If not, write us. The Brown sells for \$15.00 complete.

It's the only tire pump that includes Spark Plug, Recording gauge, Self-Opening Valve Connection and Air Hose as part of its regular equipment.



The Brown Company, 120 Bellevue, Syracuse, N. Y.

400% Increase In Two Years

—Is the Record Made by the GLIDE

The connection between this 400% increase and the dealer is shown on the profit side of the books of all our dealers—for our increased business means a corresponding increase for them.

If you are desirous of obtaining selling rights for the GLIDE in your locality write us. The selling possibilities of the GLIDE are tremendous, for the simple reason that a GLIDE dealer has a car that his competitor can't touch in quality or price.

Our liberal contract terms and proposition to agents has met with great favor from all our dealers. Write us, while territory is still open, and we will lay our plans bare before you. Address—

THE BARTHOLOMEW COMPANY, 215 Glide Street, PEORIA, ILL.

Glide

Worth
Twice
What Its
Price Indicates



Model 36-42, 5-Passenger Touring, Completely Equipped - \$1690

Star Features That Brought This Wonderful Increase:

- Automatic Dynamo Lighting System.
- Motor-Driven Tire Pump.
- Unit Power Plant.
- Long Stroke Motor, with enclosed valves.
- Center Control.
- Left Side Drive.
- Electric Side Lamps in Dash.
- Electric Headlights and Tail Lamp.
- Self-Starter.
- Floating Rear Axle with Pressed Steel Housing.
- Demountable Rims (Baker Bolt-on).
- 118-inch Wheel Base.
- Goodyear No-Rim-Cut Tires.

When Writing to Advertisers, Please Mention Motor Age.

Reduce the High Cost of Motoring and add to its comforts by equipping with



GABRIEL

Rebound Snubbers

Low Up-Keep Expense. Snubbers minimize the jolts, jars and bouncing that rack your car and create excessive repair expense. One season's savings repays their cost.

A Year or Two Extra Service. It's not mileage, but rough riding that wears out your car. Experience proves that the protection given by Snubbers will keep the car in serviceable condition an extra year or two.

Utmost Riding Comfort. By retarding the

up-swing of the car body, Snubbers prevent the occupants from being bounced off the seat. They ensure the utmost easy riding on rough roads without restricting spring action on smoother roads.

For Modern Cars. Snubbers are the one device of their kind that secures these results on modern high-set springs now in universal use. Practically all leading car builders are using them.

Easy for anyone to put on without drilling or marring the car. Simply clamp coil to frame and pass belting around the axle. Noiseless at all times. Requires no after adjustment and will outlast the car.

Standard factory equipment on the easiest riding cars

PEERLESS STEARNS WHITE

Price for cars of 1200 to 5000 lbs., \$25 to \$40 per set of four, half that per pair

GABRIEL HORN MFG. CO., 1415 E. 40th ST., CLEVELAND, O.

Makers of the Famous GABRIEL Musical Horns and Auto Accessories.

Why don't you own the vulcanizer you're paying for?

Yes, actually paying for it in tire service that you might have—but don't get. You know what happens when you let a casing cut gather dirt and water for a hundred miles. The fabric, that ought to be protected by the tread, rots, and you have a blow-out that ruins the tire.

Unless you have a vulcanizer, casing cuts will never get any attention. They don't look important enough to turn over to a garage for repair.

Result—you buy two tires where one would do as well.

SHALER Vulcanizer

If you'll fill the cuts and gashes in your tires with new, live Para rubber, and weld it in with a Shaler Vulcanizer, the tire will be as good as new until the tread is worn through. Why endure the trouble and danger and expense of blow-outs when there's this sure remedy? There is no satisfactory substitute for vulcanizing. No other method makes permanent repairs. All tube injuries are mended with the same vulcanizer.

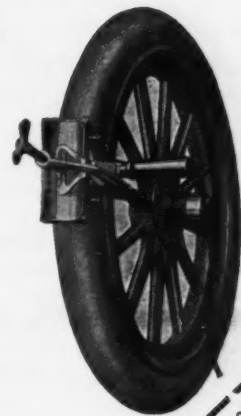
You or your chauffeur can do the work in spare moments. No skill or experience necessary. Full directions and a supply of repair material accompany each machine.

Shaler Vulcanizers operate from your electric lighting circuit or with alcohol lamp. Prices, \$2.00 and up.

C. A. SHALER CO.

221 Fourth Street

WAUPUN, WIS.



Send This Coupon today and receive a complimentary copy of "Care and Repair of Tires." It gives a remedy for every tire emergency. Write today.

Send me a copy of Care and Repair of Tires Free.

NAME

ADDRESS

C. A. SHALER CO.,
221 Fourth Street,
Waupun, Wis.



What Every Motorist Must Look Out For

Three of "the boys" are going home from a little party. They're all good fellows—don't care *just now* whether you hit 'em or not, but—on sober reflection later they would hold *you* responsible if you did.

Although you may not mind ditching your car to avoid collision, you know that even damage to somebody else's pigs or chickens offers an introduction to a damage suit. You know too that many a man is ready to sue for "injuries sustained and permanent disability" even if you only run over his big toe.

Good brilliant headlights served by a Gould Storage Battery are therefore MORE than a pleasure for night riding on dark roads—safer than insurance and in fact a real necessity. Now that such equipment has become so reasonable in cost, so dependable, so easily applied to any car, you can't afford to take chances any longer. Your garage man could install a Gould Battery on your car or you could do it yourself. Write for booklet, "Lighting Automobiles by Electricity."

Gould Storage Battery Co.

GENERAL OFFICES: 30 EAST 42nd ST., NEW YORK

Boston: 89 State Street. Philadelphia: 613 Betz Bldg. Chicago: The Rookery. Detroit: 909 Woodward Ave. Cleveland: American Trust Building. San Francisco: 904 Rialto Building

WORKS: Depew, New York

Agents in: Washington, Kansas City, Denver, Detroit, Topeka, Los Angeles, Seattle, Winnipeg, Montreal and Toronto
Full Stock of Parts, Plates, and Repairs Carried by All Offices and Agents

Milwaukee MOTORS Famous for their Silence

You have seen cars with the "ague"—with shivering vibrations running up and down them from radiator to tail lights—with power plant pounding under the hood. The car with the "ague" is on the short road to the scrap heap.

All this noise and vibration has been designed out of MILWAUKEE MOTORS. It took years of experimenting to do it, but scientific engineering triumphed in the end.

The life of a car is no longer than that of its motor. MILWAUKEE MOTORS because of their **silent, vibrationless** action have no superior in point of longevity. Cars which carry them enjoy long service, because their vital parts are not shaken and jolted into disrepair.

MILWAUKEE MOTORS are made in all sizes for all requirements—for both pleasure cars and trucks. They are furnished as Unit Power Plants or without transmission, clutch and control. Built to accommodate any standard transmission. Can be equipped with any standard electric lighting and starting device.

BUILT IN THE FOLLOWING SIZES

4-CYLINDER MOTORS

- 4 5/16x4 1/2. Unit Power Plant or Alone, Cylinders Cast in Pairs.
- 4 1/2x5 1/4. Unit Power Plant or Alone, Cylinders Cast in Pairs.
- 4 3/4x5 1/4. Unit Power Plant or Alone, Cylinders Cast in Pairs.
- 4 3/4x6. A Special Truck Motor. Cylinders Cast in Pairs. Not furnished as Unit Power Plant.
- 4 1/2x5 1/2. Unit Power Plant or Alone, Cast en Bloc. For Pleasure Cars and Light Trucks.

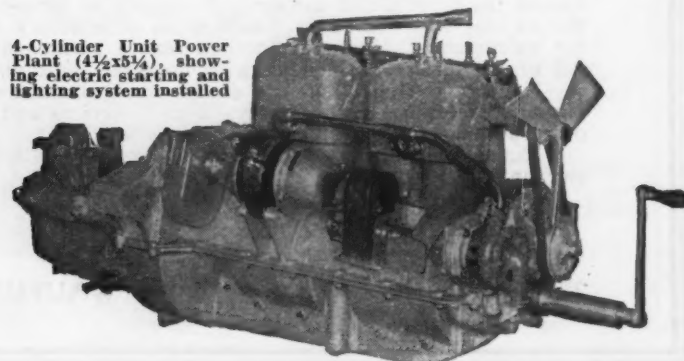
6-CYLINDER MOTOR

- 4 1/2x5 1/2. Unit Power Plant or Alone, Cast en Bloc.

WRITE FOR DESCRIPTIVE MATTER

Milwaukee Motor Co.

MILWAUKEE, WISCONSIN



4-Cylinder Unit Power Plant (4 1/2x5 1/4), showing electric starting and lighting system installed



**"PULL
OUT
THE NAIL
AND RIDE
AHEAD"**

That is the slogan of motorists who have treated their tires with "PUNCTURPRUF." "PUNCTURPRUF" seals punctures automatically, instantly. "PUNCTURPRUF" is not a filler. It is a liquid which is injected into inner tubes through their valve stems. It occupies but 5% of the air space—its weight is negligible—and you ride on a cushion of air. Puncture your tire—pull out the instrument of penetration—the air pressure in your tube forces "PUNCTURPRUF" into the breach—as soon as "PUNCTURPRUF" meets with the outer air it instantly coagulates—thickens and forms a small, durable elastic plug. Beats tinkering with tire-irons, patches, cement, and a hand-pump, doesn't it?

Puncturpruf

*The Treatment That Took The
"Punch" Out Of Puncture*

"PUNCTURPRUF" almost doubles tire life by keeping your tires properly inflated at all times. "Slow leaks" are impossible. Porous tubes are made air-tight. Tire pumping is almost entirely done away with.

**Guaranteed Satisfactory or Your
Money Refunded**

"PUNCTURPRUF" is absolutely guaranteed not to freeze or solidify—not to injure tubes or casings in any way. Your money back if it doesn't do all we claim for it. Write for circular containing full information about "PUNCTURPRUF."

PRICES

	Per set
Auto Tires 5 inches or over.....	\$20.00
Auto Tires 4 inches and 4½.....	15.00
Auto Tires 3½ in. and under.....	10.00
Motorcycle Tires	3.50

DEALERS: We are establishing Service Stations throughout the United States for the treatment of tires with "PUNCTURPRUF." We are prepared to give reliable dealers exclusive agency rights. Write or wire us.

Gray-Dexter & Co.

**Main Offices & Factory
LIMA, OHIO**

**BRANCHES AT
CLEVELAND
NEW YORK**

**CEDAR
RAPIDS, IA.**

Sanford Bros.—Chattanooga, Tenn., Exclusive Agents for Southern Territory.

Geo. L. Weller & Co.—1148-1156 S. 4th St., Louisville, Ky.

Ames & Taylor—1322 Michigan Ave., Chicago, Ill.

P. W. Smith—Springfield, Mass., Exclusive Agents for Eastern States and New England States.



Free to Dealers Billings & Spencer Counter Display Stand

Made of attractively enameled sheet metal.

Light in weight, strong and durable.

Enables a customer to make a quick selection.

Wrenches clamped to a projecting metal strip, and this displayed to best possible advantage.

An ornament to the hardware counter—a practical means of enhancing the sale of wrenches.

There is a way in which you can get one of these B. & S. Counter Display Stands free.

MAIL BACK THE COUPON FOR PARTICULARS

The Billings & Spencer Co.

HARTFORD, CONN.



**The
Billings
& Spencer Co.,
Hartford, Conn.**

Tell me how I may get a
Billings & Spencer Counter
Display Stand free of charge.

Name

Address

"There's a mighty big difference in lubricators!"

Don't blame your car for what it can't help. Many a car is inefficient only because its lubrication is bad. Try Badger Gear Compound just once and notice the difference.



BADGER Gear Compound

Is "Always on the Teeth"

It never runs thin and stays where you put it. Will not pack the sides of the gear case. Nothing like it for minimizing wear and quieting rear axles and transmissions. Every ounce lubricates. Learn more about this power-saving lubricant — also about the popular F. V. Motor Oil and Badger Lubricants. Ask your dealer or write us.



Dealers, Write Us

WADHAMS OIL COMPANY
Milwaukee, Wis.

The **Hollenden**

European Plan

800 Rooms

Rate with Bath
\$2.00 to \$5.00

Automobile Headquarters
Cleveland, Ohio

**Accuracy
Durability
Reliability
Economy**

are assured to the greatest extent in charging stations and other electric plants, by the use of the

WESTON

**SWITCHBOARD
and PORTABLE**

Instruments for Electrical Measurement

These instruments represent the greatest advance thus far in the art of electrical measurement.

Full information is contained in catalogs which will be sent upon request.

Weston Electrical Instrument Co.
NEWARK, N. J.

New York	Boston	Denver	Birmingham	Montreal
Philadelphia	San Francisco	Cleveland	Toronto	Paris
Chicago	St. Louis	Detroit	London	Berlin



"CASEY" MAKES YOUR OLD TIRES WEAR TWICE AS LONG

K. C. INNER TIRES

Double the life of your tires, stop punctures and blowouts, cut down upkeep and increase your comfort and security.

The cost is very small. The saving of time, trouble and money is very great

The Overlap

feature of Kant Creep Inner Tires gives complete protection to the inner tube at every point. Prevents rim cuts, creeping, pinching. Approved and recommended by tire manufacturers. Get our free booklet "The Tire Question."

Dealers—This is the liveliest wire in the business. Write today for agency

THE WESTERN TIRE & RUBBER CO.
Manufacturers
KANSAS CITY, MO.

EMPIRE

Porcelains—

You can crack them with a hammer

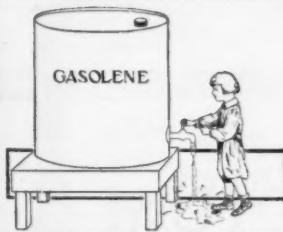
No motor cylinder has ever become hot enough to crack one of them, however. And it's in the cylinder that a spark plug COUNTS—not under a hammer.

Spark plug manufacturers who want a porcelain that is as tough and rugged as human hands can make it, will specify "EMPIRE."

Manufactured by expert workmen, of specially selected kaolin imported from Cornwall. Fired at a temperature of 2,600° F.—many times greater than any heat met with in actual service. Subjected to brutal efficiency tests for breakage and long life.

Write for Sample and Catalogue

Empire China Works
142-156 Greene St., Brooklyn, N.Y.



A DANGEROUS PLAYTHING FOR YOUR CHILDREN

Why Gasolene is Dangerous Around Home

"Gasolene evaporates rapidly and the gas it makes is seven times more dangerous than gun powder. A single spark would cause a frightful explosion." (Extract taken from "Individual Fire Fighting," published by the Rochester (N. Y.) Chamber of Commerce.) Is this volatile, elusive liquid a safe plaything for your or your neighbor's child? Then why store it above ground? Why not put it away in a

Bowser Safe Oil Storage System

where it is as safe to handle as water and out of innocent children's curious reach? These outfits are built to conform to that measure of safety prescribed by the National Board of Fire Underwriters and their Laboratory is so labeling them. Is it any wonder that out of the

MILLION SATISFIED USERS

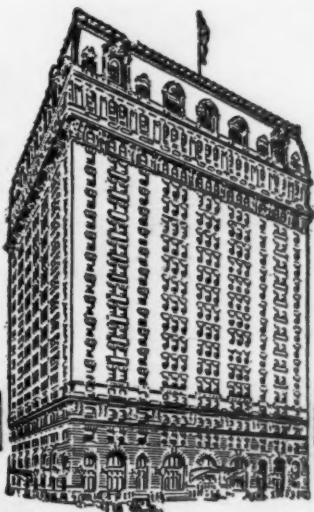
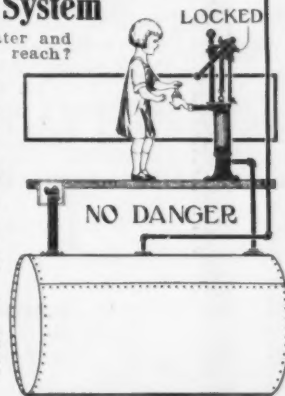
all over the world there has never been a fire traced directly or indirectly to their use? Isn't this better than an insurance policy? It is a fire preventative and you pay the premium but once.

Write for our handsomely illustrated book, "At the Sign of the Red Sentry." Mailed free upon request. It will give you details on oil storage that are well worth your reading.



S. F. BOWSER & CO., Inc.
Home Plant and General Offices
Box 2126, FT. WAYNE, IND., U. S. A.
Sales Offices in all Centers and
Representatives Everywhere

Original patentees and manufacturers of standard, self-measuring, hand and power driven pumps, large and small tanks, gasolene and oil storage and distributing systems, self-registering pipe line measures, oil filtering and circulating systems, dry cleaners' systems, etc. Established 1885



Hotel La Salle

CHICAGO'S FINEST HOTEL

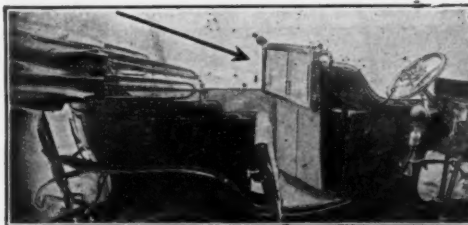
ERNEST J. STEVENS, Vice-Pres. and Mgr.

Located in the heart of the city, within easy reach of all railway terminals

RATES

ONE PERSON	Room with detached bath.....	\$2 to \$3 per day
	Room with private bath.....	\$3 to \$5 per day
TWO PERSONS	Room with detached bath.....	\$3 to \$5 per day
	Room with private bath.....	\$5 to \$8 per day
TWO CONNECTING ROOMS WITH BATH		
Two persons	.....	\$5 to \$8 per day
Four persons	.....	\$8 to \$15 per day
SUITES	.....	\$10 to \$35 per day

LA SALLE AT MADISON STREET, CHICAGO



CLOSED VIEW

The "J. H." Tonneau Shield

(Patented)

A CLOSED CAR IN A MINUTE. LIMOUSINE COMFORT AT WINDSHIELD PRICE.

The Ideal shield for the women. Don't take the other fellow's dust. For the snow, rain or wind use

The "J. H." Tonneau Shield

fits any car, easy to operate, it is exclusive and has a rich finish. Agents wanted for a real live accessory. Send for particulars

The
"J. H." Tonneau Shield Co.

225 W. 49th St.
New York City



OPEN VIEW

When Writing to Advertisers, Please Mention Motor Age.

Chrome VANADIUM Steel

As year after year passes by, you undoubtedly have noticed a wonderful improvement in the quality of your products and you realize that invariably high quality is synonymous with long experience.

And so it has been with **OUR CHROME VANADIUM STEEL**. We were pioneers in this industry and have been second to none in progressiveness, hence it may readily be believed that our long experience is evidenced in the excellence of our product.

OUR CHROME VANADIUM STEEL is made under our own secret process, patents for which are now pending.

Write for our booklet on Chrome Vanadium Steel.

The United Steel Co.

CANTON, OHIO

New York Chicago Detroit Cincinnati



Yours for Cleanliness

Old Dutch Cleanser is the good friend that brings cleanliness, and lessens the hard work of every cleaning task. On lavatories, floors, woodwork, nothing else cleans with so little effort and time.

A little Old Dutch Cleanser will quickly free your hands of stubborn discolorations, dirt and grime.

Many Uses and Full Directions
on Large Sifter Can— **10c**



False Mileage

eats into the very foundation of the upkeep of pleasure and commercial vehicles. A VEEDER HUB ODOMETER is the positive watchman for tire, gasoline or "juice" mileage—it can't be fooled.

Neat, durable and compact, it can be easily attached. Price complete, **\$25.00**

At your dealer's direct from our factory or at the following agencies:

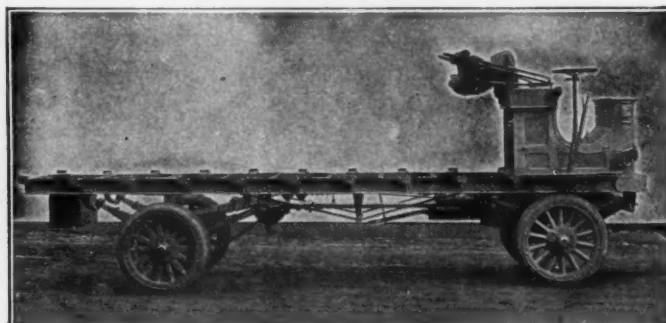
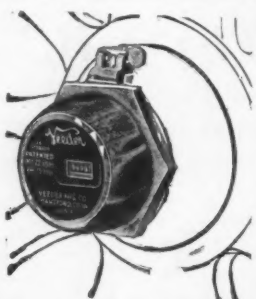
T. H. Cranston & Co., 56 E. Randolph Street, Chicago, Ill.

Bernard I. Bill, 543 Golden Gate Avenue, San Francisco, Cal.

The Veeder Manufacturing Company

C. H. VEEDER, President D. J. POST, Treasurer
H. W. LESTER, Secretary
HARTFORD, CONN.

Makers of Cyclometers, Odometers, Tachometers, Tachodometers, Counters and Small Die Castings



Johnson Trucks

1-Ton
2-Ton — Chasses
4-Ton

Write for Specifications

JOHNSON SERVICE CO., Milwaukee



Which for You?

Many a car is not equipped with a towline, as all cars should be, because the owner doesn't want to cumber it up with heavy, bulky manila rope. Basline Autowline is light, neat, compact and

Coils Up Flat Under a Cushion

It is 25 feet of famous Yellow Strand wire rope. Pulls a 4,000-lb. car up a 20% grade. Starts a stalled car on its own power. \$3.75 at your supply dealer's. Buy one today and be equipped for every emergency of the road.

DETAILS FREE Send now for fully illustrated Autowline circular

The Little Steel Rope with the Big Pull

**BRODERICK & BASCOM ROPE COMPANY, 813 North Second Street
ST. LOUIS, MISSOURI**

New York Office, 76 E. Warren Street

Manufacturers of world-famous Yellow Strand Wire Rope

HERZ PLUG

Eventually you will disregard the cheap hardware commonly called "Spark Plugs," and use the HERZ PLUG—the only Plug that is or can be

Guaranteed a Year

The usual Spark Plug troubles are unknown to users of the HERZ PLUG. Once installed, it never is taken out.

Double Blue Enamel Stone

No Sooting—No Cleaning—No Porcelain—No Breakage.

No Experiment: In its 20th Year

Price \$1.50 postpaid. Ask your dealer, or write us.

We also make the **HERZ MAGNETO**

HERZ & CO.
295 Lafayette St. New York.



The Stutz Car Has the Endurance

When a man pays his good money for a motor car, in addition to the graceful lines, the beautiful finish, luxurious, comfortable equipment—he has a right to expect *endurance*. Unless a car has the *endurance* it will never earn its purchase price, because *endurance* means service—means *cost per mile*.

Ask any man that *knows* motor cars—ask any man that drives a Stutz—and he will unhesitatingly tell you that the Stutz is famed for its *endurance*.

Endurance Is Built Into the Stutz

The Stutz never fails on any road or hill. It will plow through the deep mud and the sand, because *endurance* is built into it. The Stutz has a record unequalled for consistent performance and *endurance*.

No Stutz has ever been taxed to its utmost, because the makers build into the Stutz a *reserve endurance* that laughs at the most severe road conditions ever encountered.

Endurance Means Bigger Car Value

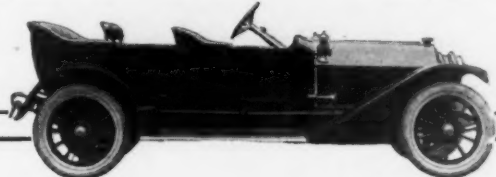
The workmanship and finish are all anyone could desire—it is exceedingly easy riding and comfortable. The straight line, low slung body, deep upholstery and luxurious appointments, give the Stutz an aristocratic design, dignity and quality not exceeded in any of the higher priced cars.

And the *endurance* in the Stutz means bigger car value, more satisfaction and longer life at a *lower cost*.

If you are in the market for a car—if you are a dealer looking for a car to handle exclusively, or to strengthen your present line—before you close, *investigate the Stutz*, the car that has made a record for *endurance*.

Write today for descriptive literature, etc. Ask for Catalog A-2.

STUTZ MOTOR CAR COMPANY
Manufacturers of Stutz Cars **Indianapolis, Ind.**



THE Fools

In the Plant of The Telling Bros. Ice Cream Co., Cleveland, Ohio, three of these engines (80 H. P. each) ran with a 7 H. P. overload for 13 consecutive weeks. This would not be possible with an engine using Jump Spark or ordinary Make and Break ignition, but with the Wipe Spark Igniter Fools Engines can be operated continuously with perfect ignition results. The revolving Wipe Spark Igniter cleans itself automatically during each impulse—absolutely preventing carbon deposits. This igniter is comprehensively shown in Bulletin F-53.

Fools GAS ENGINE Co.
Springfield, Ohio.

PREMIER Inner Tire Sleeve

The Scientific Blowout Preventive

It halves tire upkeep—doubles mileage. It is totally different in application from any sleeve on the market. It is wrapped "surgeon fashion" around the inner tube for a distance of from 10 to 16 inches (depending on the size of the tire). It can be applied in 5 minutes' time. It brings a 3-ply protection of interlock woven fabric over the weak spot in your tire. An inner patch—furnished free—is applied over the blowout hole for protection from the road.

One ply of this fabric will stand 450 pounds pressure per sq. inch. You get the use of 3 plys.

PREMIER Inner Tire Sleeves don't lace. They can't creep, chafe or buckle. It is impossible for the tire to bulge after the sleeve is in. Resiliency is in no way affected.

Carry PREMIER Inner Sleeves with you on tour. As soon as you notice stone bruises or the first sign of a rim cut—sure forerunners of a blowout—reinforce your tire with a PREMIER and forget it. You can bolster up blown out tires, almost ready to discard, with a PREMIER and get from 500 to 2,000 miles additional service from them. Worth in increased mileage and freedom from tire trouble 5 times their price. Get yours today.

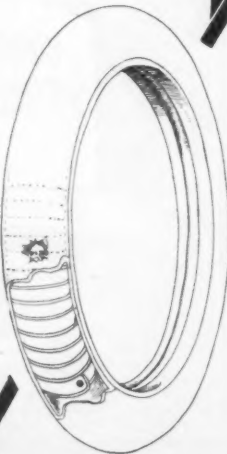
Satisfaction Guaranteed or Money Refunded

Prices, Each, Including Inner Patch:

3"	\$2.00
3½"	\$2.25
4"	\$2.50
4½"	\$2.75

Sent prepaid by Parcel Post

PREMIER MFG. COMPANY
157 West Indiana Street
CHICAGO



Dividend Payers!

For Dealers who know

Harris Gasoline Gauges

Wolf Gasoline Mixers

The Specialties with the Little Price and Big Profits

Write Today for Yours

Approved Auto Specialties Co.

Dept. B, 1731-37
Broadway, New York

Starts — Lights — Ignites

REMY

Six Volt System—Does-It-All

WE are the only factory able to assume complete responsibility for the *entire* efficient electrical equipment of your product. Remy apparatus is furnished as a whole—or in any combination. The Starting and Lighting equipment is furnished to manufacturers only.

Risk of obsolete equipment is eliminated; service demands of the individual owners are centered in one factory.

Because the Remy is a fourteen year old concern with a national service organization, you are guaranteed *permanent efficiency*.

Liberal magneto (any make) exchange offer.

Remy Electric Company

General Offices and Works, Anderson, Indiana

BRANCHES:
New York Detroit Kansas City Minneapolis
Boston Chicago San Francisco

(Service stations throughout the country)

"Buckeye Shock Absorbers"

Guarantee Easy Riding on the Roughest of Roads

Allows downward motion of springs to act naturally, thus giving full spring resiliency on the smooth road.

Absolutely prevents broken springs, the absorbers taking the shock when springs rise above their neutral position.

\$5.00 per pair

The "Buckeye Shock Absorbers"

will soon pay for themselves in saving on the up-keep of your car alone, besides the absolutely smooth riding that they insure.

Springs full oil tempered and tanned straps of genuine California Latigo stock. Attached in a few minutes—no holes to drill.

Carried in stock by jobbers in all principal cities or sent direct on receipt of price. Weight, 5½ lbs. per pair.

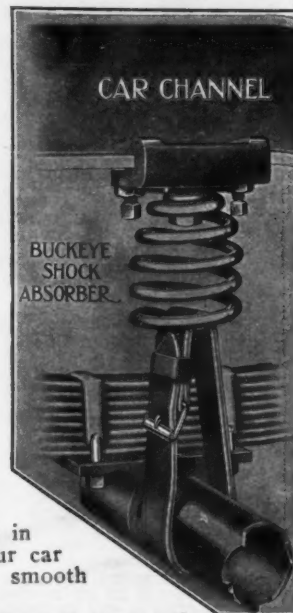
MANUFACTURED BY

The Central Brass & Fixture Co., Springfield, O.

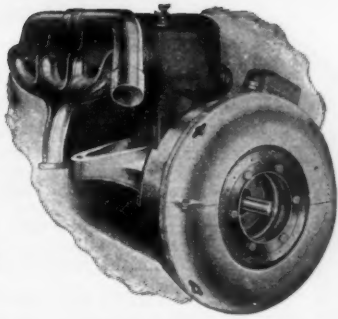
CANADIAN DISTRIBUTORS:

JOHN MILLEN & SON,

Montreal, Winnipeg, Toronto, Vancouver



U-S-L



U-S-L

Takes the place of the Fly-wheel

The U-S-L Electric Starter and Lighter is a combination motor and generator that takes the place of the fly-wheel. The armature of the motor-generator is bolted directly to the engine crank-shaft.

The U-S-L doesn't add a single extra moving part to a car.

No gears or chains	No extra clutches
No added weight	Starts at a push of foot-button
No bearings to oil	Supplies ample current

Adopted by
Rambler, Overland, Garford,
Edwards-Knight, Moyer, S. G. V.

Write for Bulletin 501

The U. S. Light & Heating Co.

General Offices: 30 Church St., New York

Branch Offices and Service Stations—New York, Boston, Buffalo, Cleveland, Detroit, Chicago, St. Louis, San Francisco.

This Guarantee on J-M Dry Batteries Protects You

"If J-M Dry Batteries do not prove satisfactory, we will supply new batteries without cost, issue credit for same, or refund purchase price including transportation charges."



You assume no risk.

Why use a battery that does not carry these qualifications?

Prompt shipments from twenty-four distributing points, if not at your dealer's.

Write nearest branch for booklet

H. W. Johns-Manville Co.

Albany	Cincinnati	Kansas City	New Orleans	San Francisco
Baltimore	Cleveland	Los Angeles	New York	Seattle
Boston	Dallas	Louisville	Omaha	St. Louis
Buffalo	Detroit	Milwaukee	Philadelphia	Syracuse
Chicago	Indianapolis	Minneapolis	Pittsburgh	

THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED.
Toronto Montreal Winnipeg Vancouver 2001

SEASON 1913
IN EFFECT MARCH 1st 1913
GILBERT
MOTOR CAR
ACCESSORIES
THE
GILBERT MANUFACTURING
COMPANY
NEW HAVEN CONNECTICUT
NEW YORK BRANCH 2010 BROADWAY

SEND for this BOOK

IT is our latest catalogue and it shows all the recent developments in tire covers, lamp covers, tube cases, tool rolls, magneto covers, etc.

FREE

Special designs for all the latest equipments.

The Gilbert Manufacturing Co.
NEW HAVEN, CONN.
New York Branch, 2010 Broadway, corner 68th Street



Type I-F Ammeter

METERS are as essentially a part of the electric lighting equipment as gauges are a part of the steam boiler, and who would think of operating even a small steam heater without suitable gauges?

True, the hazard is greater with the boiler, but the safety valve takes care of that.

By means of the gauges you are enabled to operate your boiler more intelligently and increase its efficiency.

If a manufacturer tells you that meters are unnecessary with his lighting equipment, he deceives himself. If you rely on his statement, you deceive yourself.

Hoyt Meters

are the accepted standard in automobile lighting.

ASK FOR BULLETIN 7

Hoyt Electrical Instrument Works
Penacook, N. H.

MOTOR DRIVEN SAMSON HORNS

6 STYLES



NO. 11—SAMSON
12 3/4" Overall

Loud
Simple
Strong
Reliable
Guaranteed

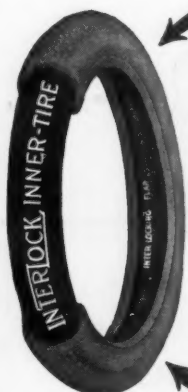
Live Dealers,
get our mon-
ey making
offer quick.

AMERICAN ELECTRIC COMPANY

State and 64th Sts.

Manufacturer

Chicago, U. S. A.



INTERLOCKS

**Double Your Mileage
and Stop Tire Trouble**

Interlocks are complete inner tires—not inner shoes—placed between the outer casing and inner tube to strengthen the casing and protect the tube from punctures. They insure safety—make new tires give twice the usual mileage, and add 1000 to 5000 miles to old ones. Don't affect resiliency. Make your tires blow-out proof.

Car Owners and Dealers

write for our booklet giving facts about road tests, prices, testimonials, and our 1913 proposition.

DOUBLE FABRIC TIRE CO.
128 West 9th Street
AUBURN, IND.

Guide



Portable
Trouble Light

THE handiest acces-
sory on your car
for locating trouble,
making repairs or in-
specting your engine.
Write for Guide
Book No. 6 describing
many other kinds of
automobile lights.

THE GUIDE MOTOR LAMP MFG. CO.
East 4th St., Cleveland, Ohio (31)

THE
MASTER
CAR

FIAT

16th
YEAR

6 Cyl. 50 H. P. \$5000
4 Cyl. 55 H. P. \$4500
4 Cyl. 35 H. P. \$4000

F. I. A. T.

POUGHKEEPSIE

NEW YORK

1-893
HAYNES
1913

America's First Car—

after twenty years of continuous successful manufacturing

—Still It's Foremost

Wide Line of Models

HAYNES AUTOMOBILE CO.,

Kokomo, Ind.

Everything In Sheet Metal for the Automobile

We manufacture only one unit of the automobile—the sheet metal parts. They are twenty in number—but the same nature underlies them all. Hayes sheet metal parts are built into nearly every automobile made. We're the largest users of sheet metal in the world. We do only one thing—and do it well. That's the reason.

Hayes Manufacturing Co.

DETROIT, U. S. A.

STAPLEY
TIRE PUMP

**Always Ready
Always Works**

The STAPLEY is a compound pump. Has seamless brass tube cylinders, non-leakable joints, automatic valve and heavy cast base. A Guaranteed tire pressure gauge if you want it.

Price without gauge
\$4.00

With gauge
\$6.00

BRIDGEPORT BRASS COMPANY

P. O. Station A.

Bridgeport, Conn.



Motor Age

CONTAINS WEEKLY

—THE—
BEST BUDGET OF
AUTOMOBILE NEWS
IN THE WORLD

Marion

Touring Cars		Roadsters	
37-A		36-A	
30-40 H.P.....\$1475		Bobcat .....\$1425	
48-A		38-A	
48 H.P.....\$1850		30-40 H.P.....\$1475	

All cars completely equipped

ELECTRIC STARTER—ELECTRIC LIGHTS

THE MARION MOTOR CAR COMPANY
902 Oliver Avenue, INDIANAPOLIS

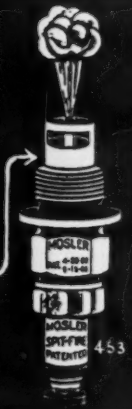
Mosler Spit Fire Plugs

are the BEST

FOR 13 YEARS HAVE BEEN LIKE THIS

INSIST ON OUR
GENUINE PLATINUM POINTED PLUGS

A. R. MOSLER & CO.,
P. O. BOX "M", MT. VERNON, N. Y.



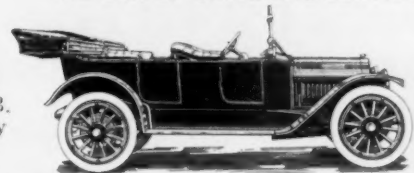
Premier

America's
Greatest Touring Car
PREMIER MOTOR MFG CO.
INDIANAPOLIS IND.



"THE CAR OF UNFAILING SERVICE"

\$1950
F. O. B.
Factory



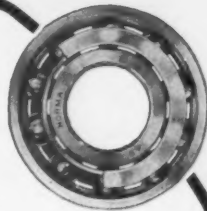
Completely
Equipped

DREADNOUGHT MOLINE M-40

Catalog and Dealers' Proposition on Request
Moline Automobile Co., 2 Keokuk St., E. Moline, Ill., U.S.A.

NORMA

Precision
Ball Bearings



The degree of precision realized and sustained in Norma Ball Bearings is such as to maintain the exactly right relations between balls, cage and races which mean perfect freedom of movement and the minimizing of friction, without that looseness which causes noise and which ultimately gives rise to uneven wear, increasing friction, rapid deterioration and ultimate failure.

BULLETIN 102

THE NORMA COMPANY
OF AMERICA

20-22-26 Vesey St.,

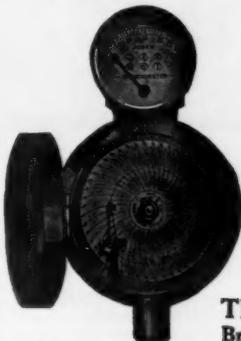
New York

Reo the Fifth

Final and crowning achievement of R. E. Olds, pioneer designer of autos. A standard size 30 to 35 horsepower four-cylinder car of modern refinements priced at only \$1095.

R. M. OWEN & CO., General Sales Agents
REO MOTOR CAR CO., LANSING, MICH.

Are Your Trucks Efficient?



You can only determine by record of performance. Human records are not reliable—

The Jones Recorder furnishes reliable performance records. The record is in the form of a graphic chart—easily interpreted and easily understood. The lines on the chart tell the story of speed, of starts, of stops, of distances, of loading and unloading intervals.

It is the means for the elimination of waste in the delivery organization.

Write for further information.

THE JONES SPEEDOMETER
Broadway at 76th Street, New York

Plants, Bush Terminal, Brooklyn, N. Y., New Rochelle, N. Y.

The Pilot "THE CAR AHEAD"

Three Great Models: Pilot 40—Four cylinders, 4½x5; brake tests: 53 horse-power; 120" wheel base; price, \$2000. Pilot 50—Four cylinders, 4½x6; brake test, 59 horse-power; 126" wheel base; price, \$2250. Pilot 60—Six cylinder, 4x6; brake test, 67 horse-power; 132" wheel base; price, \$2500.

The Car Without a Mechanical Defect

Teetor "T" head motors, full floating rear axles, Brown-Lipe differential, Warner transmission, Elsemann magneto, Stromberg carburetor, handsome jewel bodies with ventilating windshield. Completely equipped, with every convenience and comfort. Dynamo electric lighting and electric starter (Gray & Davis system), power tire pump. We have the greatest agency proposition in the United States.

Write for our beautiful art book showing cars in detail

PILOT CAR SALES COMPANY

Richmond, Indiana

Imperial



INVESTIGATE
These Five Great Cars NOW

Imperial Offers Unusual Values for 1913

MODEL 32.....\$1285	MODEL 33.....\$1285
MODEL 34.....\$1650	MODEL 44.....\$1875
MODEL "SIX"—60.....\$2500	

Supreme in Beauty and in
 Constructional Merits

Imperial Automobile Co., Jackson, Mich.

Detroit Mechanical Starters

**For Ford Model T Cars
 Are 100 Per Cent Efficient**

They are dependable, strong and sure. Do away with that back-breaking job of spinning your engine with a crank.


DETROIT MECHANICAL STARTERS are low priced and easily put on. Write for further information.

DETROIT MECHANICAL STARTER COMPANY
 1191 Woodward Avenue Detroit, Michigan

HENDERSON

"The Car of Your Dreams"

Six Models
 \$1,285 to \$1,685



HERE is truly a car of today. Such features as Ward Leonard Electric Self-Starter, Dynamo Electric Lights, Single Lever Center Control, Left Side Drive and Gasoline Tank Under Cowl, are all built into the car. They are not "afterthoughts"—tacked on. Henderson Wire Wheel models are designed with special hubs making them interchangeable with wood wheels. The automobile buying public is not slow to appreciate such cars at such prices. This is evidenced by our dealers everywhere.

Some territory still open—write for terms.

Henderson Motor Car Co.
 of Indianapolis, U. S. A.

BLACK EAGLE SPARK PLUG

50¢



The STANDARD COMPANY Torrington, Conn.

THE FAMOUS
Packard
Auto Cylinder Oil

Will not carbonize A perfect lubricant

GREENSLADE OIL CO.

Main Office: DETROIT, MICH.
 Pacific Coast Agency
 GEORGE L. and J. A. McPHERSON
 PORTLAND, OREGON

Our Engineers

Are ready and anxious to consult with you at any time on any plan or print.


WESTON MOTT & CO.

FLINT, MICH.

Oldest and Largest Manufacturers of
 Automobile Axles, Hubs and Rims in the World

Spicer Universal Joints

DUST PROOF
 OIL TIGHT



SPICER MANUFACTURING CO.
 PLAINFIELD, N. J.

DOMESTIC REPRESENTATIVES
 K. Franklin Peterson, 122 S. Mich. Blvd., Chicago
 Thos. J. Wetzel, 17 West 42nd St., New York
 L. D. Bolton, 2215 Dime Savings Bank Bldg., Detroit

FOREIGN REPRESENTATIVE
 Benjamin Whittaker, 21 State St., New York


EAGLEINE

CQD
 CARBON QUICKLY DESTROYS

Use EAGLEINE No-Karbon Oil

Eliminate that carbon from your cylinders. The use of EAGLEINE NO-KARBON OIL will do it.

EAGLE OIL & SUPPLY COMPANY
 104 Broad St., Boston
 1114 W. 37th St., Chicago



HOFFECKE R-WALTHAM

Speedometer

8 Day Timepiece

These famous instruments represent the highest development of accuracy and dependability in automobile equipment.

Hoffecker Speedometers and Waltham 8-Day Timepieces have been invariably selected by car owners who demand the best the world affords. Illustrated literature sent free by

The HOFFECKER CO. WALTHAM WATCH CO.
Boston, Mass. Waltham, Mass.

NEWTONE MOTOR HORNS

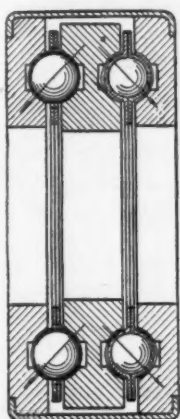
"Newtone" Trade Mark guarantees not only satisfying service, but a certain refinement in appearance and quality of warning note found in no other horn.



Torpedo Type
Price \$20

Automobile Supply
Mfg. Co.

220 Taaffe Place, Brooklyn, N. Y.



Suspension Ball Bearings

The Only Bearings That Distribute the Radial Load Over All the Balls at the Same Time

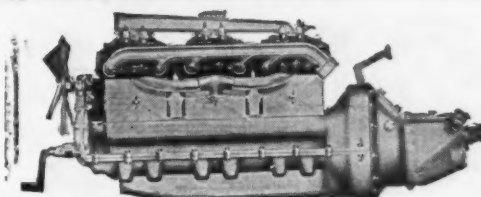
This ideal condition is no longer the engineer's dream; it is a reality.

Suspension Ball Bearings are TRUE THRUST AND RADIAL BEARINGS IN ONE. They are daily performing marvels of increased efficiency with reduced friction.

You should know more about them at once. They are applicable for all anti-friction purposes.

Every Engineer Should Write For Booklet Today.

Suspension Roller Bearing Co.
Sandusky, Ohio



BEAVER "SIX" Unit Power Plant

Beaver "Sixes" offer the following 1914 features: long stroke (3 1/4 x 5); just right power, 45 H. P.; 3-pt. suspension; large valves with enclosed action; enclosed fly wheel; 3-speed transmission; noiseless, vibrationless, oil and dust tight action; arrangement for installation of any make Electric Starting and Lighting System. Write for catalog and prices.

BEAVER MANUFACTURING CO.

Builders of 2, 4 and 6 Cylinder Motors

2800 First Avenue

MILWAUKEE, WIS

Type 35
Series
G and H



Electric
Starting
and
Lighting

MERCER THE CHAMPION LIGHT CAR

When motor car efficiency, power, durability, and speed are mentioned, all eyes focus on the Mercer.

Descriptive literature sent on request

Mercer Automobile Co. 800 Whitehead Road
TRENTON, N. J.

KLINE "FIFTY" \$2585

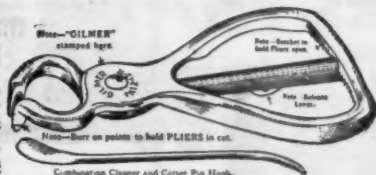
A Light Six with ample, but not extravagant power, in five body styles, with separate electric starting and lighting and separate ignition systems, and four speeds forward.

Address Department A for Catalog

KLINE MOTOR CAR CORPORATION
RICHMOND, VA. YORK, PA.
MAIN OFFICE AND FACTORY, RICHMOND, VIRGINIA

GILMER Tire Repair Pliers

are as necessary to Car Users as a pocket knife is to you—as useful as a hair pin to a woman. There are 300,000 Car Owners in the United States who KNOW that it pays to repair small cuts in Tires. ARE YOU ONE OF THEM? Hadn't you best write for free copy of "Tire Insurance," or better, send a dollar for a pair of nickel plated PLIERS and combination cleaner and cotter pin hook. They will pay for themselves the first seventy-five miles. They will pay for a set of Tires every 4,000 miles. We guarantee satisfaction.



G. WALKER GILMER, Jr.

53 North 7th Street

Philadelphia, Pa.

GOOD YEAR AKRON, OHIO

This name on Automobile Tires and Rubber Accessories signifies inherent qualities of material and workmanship that insure the maximum of service at the minimum of expense. (673)

THE GOODYEAR TIRE & RUBBER CO.
AKRON, OHIO

When Writing to Advertisers, Please Mention Motor Age.

When the Oil or Grease Fails

There is sure to be trouble, unless this contingency has been guarded against by the proper use of

DIXON'S Motor Graphite



Then there can be no trouble. For the graphite which will have adhered to the bearing surfaces will itself act as a lubricant, always minimizing friction and keeping the bearing cool until the oil or grease supply is restored. Let us send you a copy of our book "Lubricating the Motor," No. 82 and a test sample.

JOSEPH DIXON CRUCIBLE CO.
Jersey City Established 1827 New Jersey

Dart MOTOR TRUCKS

THREE EXCEPTIONAL MODELS:

Model ED—1,000 lbs. capacity (2 cyl.).....	\$ 750
Model B—1,000 to 2,000 lbs. capacity (4 cyl.).....	1,100
Model C—2,000 to 3,000 lbs. capacity (4 cyl.).....	1,775

Write us for full information and liberal specifications.

THE DART MOTOR MANUFACTURING CO.
WATERLOO, IOWA (18)

Great Western

FORTY
1913 FULLY EQUIPPED \$1585

LUXURY — POWER
ABSOLUTE SILENCE

WRITE FOR OUR NEW CATALOGUE
GREAT WESTERN AUTOMOBILE CO.
DEPT. 20 PERU, IND.

THE RUTENBER MOTOR

MANUFACTURED SINCE 1901 FOR HIGH GRADE
AUTOMOBILES and TRUCKS

8 1/2 x 5 1/2 four and six cylinder.

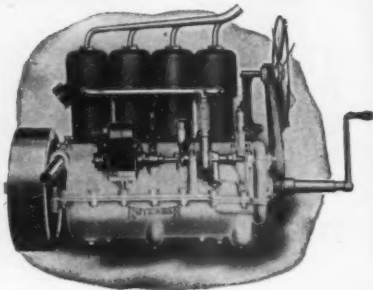
4 1/2 x 5 1/2 four and six cylinder.

Standard or Unit

and
4 x 4, 4 1/2 x 5 and 4 1/2 x 5
Standard Types. All L
Head 4 Cycle.

Manufacturers are invited to investigate our service and our facilities. Literature on request.

The Rutenber Motor Company
Marion, Indiana



SKID BLOWOUTS RIMCUTS PUNCTURES WEARING OFF OF RUBBER NIT

Each section 2 in. wide. They hook to rims. Try two or three sections over any old blowout.

Special Prices
to the First in New Territory
KIMBALL TIRE CASE CO., 173 B.W.D., COUNCIL BLUFFS, IA.

THE MAYER CARBURETOR

Gives the motor the right mixture at varying speeds, is the most economical, reducing gasoline expense a full 25 percent. And with the MAYER you can get from 15 to 30 percent more power from your motor than with 90 percent of the other carburetors on the market.

Write for catalogue No. 26E and learn the merits of the MAYER

MAYER CARBURETOR COMPANY
2673 Main Street, Buffalo, N. Y.

HESS AXLES

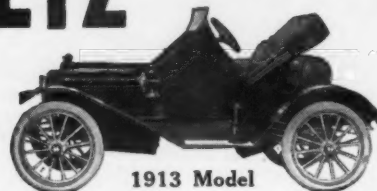
¶ HESS Axles have been on the market but 2 years. Fourteen car manufacturers in that short time exclusively adopted them as regular equipment.

¶ Renewals of HESS contracts for 1913 from past users and an increasing HESS demand among new manufacturers, is ample proof of the stability of HESS Quality.

¶ May we be of service to you? Write us.

THE HESS SPRING & AXLE COMPANY
CARTHAGE, OHIO, U. S. A.

METZ "SPECIAL" \$445



1913 Model

COMPLETELY EQUIPPED

LEFT-HAND DRIVE CENTER CONTROL

22 1/2 H. P., 4-cylinder water-cooled motor, Bosch magneto, standard artillery wheels, best quality 30"x3" clincher tires, extension top, wind shield, five lamps, gas generator, tools, etc. Makes 5 to 50 miles per hour on the high speed, 28 to 32 miles on 1 gal. of gasoline. A thoroughly practical, fully guaranteed car. You can secure EXCLUSIVE SALE in your territory.

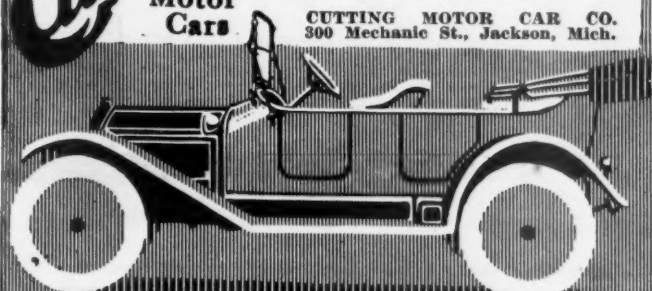
Send for Book "K."

METZ COMPANY, Waltham, Mass., U.S.A.

Cutting
Motor Cars

Five passenger touring car...\$1475
Two passenger roadster.....\$1475
The same chassis is used for both models
Wide-awake dealers write or wire for our remarkable dealer's proposition.

CUTTING MOTOR CAR CO.
300 Mechanic St., Jackson, Mich.



"Pass Them All"

Knox
BEST BY TEST

Motor Cars

Send for Pleasure or Commercial Catalogue

KNOX AUTO CO., SPRINGFIELD, MASS.



Mea
Magneto

S. R. O. Ball Bearing

MARBURG BROS. Inc.
Sole Importers

Detroit 1790 Broadway, New York Chicago



Braender Tires & Tubes

Are unexcelled for long mileage and endurance. Ask any user.

Send for price list and full particulars
Established Agents Solicited

BRAENDER RUBBER & TIRE CO.
Main Office and Factory
RUTHERFORD, N. J.
Salesrooms: 1987 Broadway, N. Y.
1211 Bedford Avenue, Brooklyn, N. Y.

Bull Dog Non-Skid

KRUPP AUTOMOBILE CRANK SHAFTS, STEEL FORGINGS AND FRAME MEMBERS, GEAR BLANKS, KRUPP BAR STEEL BALL MILLS, TUBE MILLS AND OTHER MACHINERY

USE **K R U P P** STEEL

Call for Krupp Steel In Your Car and See That You Get It

THOMAS PROSSER & SON
28 PLATT STREET NEW YORK

GRILLED IRON ROLLERS

KRUPP STEEL LOCOMOTIVE TIRES AND CAR WHEEL TIRES, CRANK SHAFTS, STEEL FORGINGS AND CASTINGS, STEEL TIERED CAR WHEELS, PROSSER BOILER TUBE EXPANDERS



The BENTON

"The Case-hardened Plug"

A Mica Plug of Superior Quality

Slow to foul, quick to clean, always reliable.
Long Service and Perfect Satisfaction Guaranteed.

All standard sizes, \$1.00
ASK YOUR DEALER OR WRITE

L. F. BENTON CO., Dept. A, Vergennes, Vt.

Elyria-Dean
TRADE MARK

REXO—Single-tone Electric Horn—\$8. Guaranteed for life—Instantly responsive—Eliminates constant care and adjustment.

TUTO—Two-tone Electric Horn—\$25. Electrically transmits two different and distinct sounds; the degree of sound being regulated by the pressure of the thumb on one button on the steering wheel.

Elyria-Dean products mfd. only by

THE DEAN ELECTRIC COMPANY
504 OLIVE STREET ELYRIA, OHIO, U. S. A.

"Look for Elyria-Dean where Quality's seen."

The BRENNAN MOTOR

ESSENTIAL TO HIGH CLASS CARS



Long stroke, large bearings, large valves. 4"x5, adapted for Regal, E. M. F., Warren, Autocar, Hudson and all standard makes of cars and trucks. We also furnish transmission gears. Two and four cylinder sizes, from 20 to 60 H.P.

Send for Catalogue "B"

BRENNAN MOTOR MFG. CO.
Syracuse, N. Y.



The New Swinehart

KEATON NON-SKID TREAD

has four times the wearing service of the ordinary non-skid. Users will tell you that they have run Swinehart Keaton Non-Skid Tread Tires a whole season without having them lose their anti-skid effectiveness. Call at any one of our stores and investigate them. We also make a complete line of Smooth Pneumatic Tires of best quality. Branches and distributing agencies in all leading cities.

SWINEHART TIRE & RUBBER COMPANY
1206 North St., Akron, Ohio

The 6-Cylinder, Reasonably Priced

de Soto 55 H.P.

The car with a stronger appeal than any recent product of the trade—the one that meets a popular demand. We have an unusually attractive proposition for dealers. Write at once for free catalog and full particulars.

Sells for
\$2,185



de Soto Motor Car Company, Auburn, Ind.



We Ship On Approval
PREPAY EXPRESS AND ALLOW
30 Days' Free Trial

The best "Nonskid" puncture-proof device for automobiles, commercial cars and motorcycles.

Try Them At Our Expense

Be your own judge—don't take any one's word for it. "The proof of the pudding is in the eating."

Perfect Score in 4 Glidden Tours
Twin Cities to Fargo, N.D., 1909.
Twin Cities to Helena, Mont., 1911.
New York City to Jacksonville, Fla., 1911.
Twin Cities to Winnipeg, 1912.

It only costs one cent to learn our prices and guarantee on "Bricton" Detachable Treads.

Write Today for Full Particulars

The Bricton Mfg. Co.
1253 Main St. BROOKINGS, S. D.

McFARLAN

Electric Lighted SIX Self Starting

SERIES "S"—45 H. P., 2, 4 and 5 Pass.—\$2,300
SERIES "T"—50 H. P., 2, 4 and 5 Pass.—\$2,500
SERIES "M"—60 H. P., 2, 4, 5 and 7 Pass.—\$2,750

New Six Passenger, Coupe and Limousine
Bodies slightly higher.

TERRITORY OPEN FOR PROGRESSIVE DEALERS

Pioneer Six-Cylinder Car Builders of America

McFARLAN MOTOR CAR CO., Connersville, Ind.

ZENITH

Gives Standard Carburetion



ZENITH CARBURETOR CO.
DETROIT, MICH.

SHELDON


AXLES & SPRINGS ARE INVINCIBLE

THE SHELDON AXLE CO.
WILKES-BARRE, PA.

CHICAGO OFFICE: 68 East 12th Street.
DETROIT OFFICE: 1215 Woodward Ave

LAMBERT

The LAMBERT Model 99 (5-passenger touring car or 2-passenger roadster) at \$1365 (fully equipped) stands at the head of its price class. It comprises 4 1/8 x 5 1/4 Rutenber motor, 117" wheelbase, famous LAMBERT friction drive, one lever control, etc. Write for catalog.



BUCKEYE MFG. CO.
ANDERSON, IND.

The Searchlight Gas Co.

1016 Karpen Building

CHICAGO, ILLINOIS

Stronger than ever, legally, financially and in the esteem of the trade. Watch us grow.

BRANCHES AND REFILLING STATIONS:

Warren, Ohio
Chicago, Ill.
Detroit, Mich.
Camden, N. J.
Philadelphia, Pa.
Kansas City, Mo.

San Francisco, Calif.
Buffalo, N. Y.
Atlanta, Ga.
Dallas, Texas
San Antonio, Tex.
Boston, Mass.

Los Angeles, Calif.
New York City
Syracuse, N. Y.
Minneapolis, Minn.
Toronto, Canada
Indianapolis, Ind.

Inter-State

Model 45, \$2750

6 Cylinder, Left-hand Drive
Center Control
132-inch Wheel Base.

INTER-STATE AUTOMOBILE CO.
MUNCIE, INDIANA



Mighty Michigan "40"

40-Horsepower Touring Car or Roadster, absolutely silent in operation. Oversize tires 35 x 4½—cylinders 4¼ x 5¼ in.—118-in. wheel base—four-forward-speed transmission—demountable rims—nickel mountings—massive, straight-line body—big, roomy seats—electric lighting by generator—everything. Price \$1585, includes full equipment. We also make a 33-H.P. model. Catalog on request.

MICHIGAN MOTOR CAR CO., Kalamazoo, Mich.



We are selling an ever increasingly greater part of our gigantic output to experienced automobile owners who have tired of the exorbitant expense of big car up-keep. More than a quarter million Fords now in service. New prices \$525 to \$800. Dealers everywhere. Ford Motor Company, Detroit, Mich.

PATHFINDER

WORTHY OF THE NAME

THE PATHFINDER car is an unusual combination of mechanical virtues. Each detail is standard in design, workmanship, and quality materials.

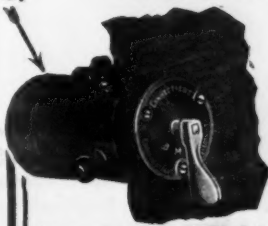
The Pathfinder chassis is a composite of the best proven ideas in European and American practice—built to withstand rough usage and to remain quiet even in "old age." The Pathfinder "selling plan" is one you will be glad to know about. It is unique and comes to you in the form of the "101 Reasons," a short, concise course in Pathfinder salesmanship. Yes, it is absolutely different—better write today, NOW!

Just ask for—
"Photo Story
of a Pathfinder"
"100 and 1 Reasons"

THE MOTOR CAR MFG. CO.
Indianapolis, U. S. A.

CONNECTIGUT

Master Vibrator For Ford Cars

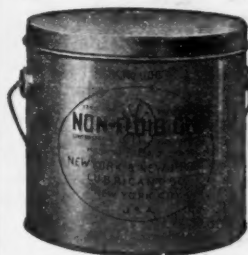


A dependable master vibrator at a reasonable price. Makes starting easy—motor-ing becomes a pleasure.

Flush Type—Price \$9.00
Delivered upon receipt of price
Send for Bulletin No. 28

Connecticut Tel. and Electric Company, Inc., Meriden, Conn.

Economy is too big a matter to be found lurking in cheap prices.



NON-FLUID OIL

Costs more than other lubricants for bearings and gears but its use reveals true Economy in dollars saved on repairs and in Efficiency retained in your car.

NEW YORK & NEW JERSEY LUBRICANT CO.
165 Broadway, New York
Chicago, 1430 Michigan Ave. Philadelphia, 1431 Vine St.

DUPLEX

EXTERNAL
BRAKES

ACT INSTANTLY

Whether car goes
backward or forward

The Royal Equipment Co.
Bridgeport, Conn.



Is There a

PAIGE

Dealer In Your Territory?

If not, write or wire us today. The Paige "36" at \$1275 and the Paige "25" at \$950 are the leaders in the popular price field. You want them, if you can get them.

PAIGE-DETROIT MOTOR CAR CO.
304 Twenty-First Street, DETROIT, MICHIGAN

THE ONE-MAN TOP



CAN BE HANDLED BY ONE PERSON AS EASILY & QUICKLY AS AN UMBRELLA
INSTANTANEOUS PROTECTION
GOLDE-PATENT MANUFACTURING CO. 513 W. 56th ST. NEW YORK.

★ STAR BALL RETAINERS ★

STAR BALL RETAINERS are famous wherever ball bearings are known. The best bearing service attends the car equipped with STAR BALL RETAINERS. We also manufacture more thrust bearings than any concern on the market. Send us your requirements.

THE STAR BALL RETAINER CO.
LANCASTER, PA.

TIMES SQ. AUTO CO.

NEW YORK

CHICAGO

S.W. Cor. 56th St. and Broadway | 1210-1212 Michigan Ave.

MOTORS
BODIES
TOPS
TIRES
EVERYTHING
AND ANYTHING
FOR THE
AUTOMOBILE
AT CUT PRICES

WORLD'S LARGEST
DEALERS
New—Used Automobiles
and Accessories

SEND FOR OUR
PRICE WRECKER

Silent

Absence of noise is vital in present automobiles—thus the popularity of Hyatt Quiet Bearings.

HYATT
ROLLER BEARING CO.
Detroit, Mich.

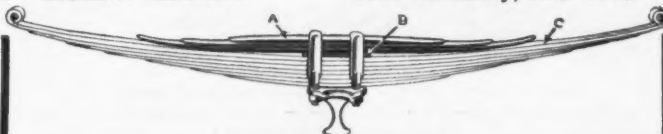


SHE'S HERE

She AMES AUTOMATIC SHOCK ABSORBER POSTER GIRL

14 x 20. Three Colors. For Framing or Hanging
Sent Postpaid on Request

Clarence N. Peacock & Company
Exclusive Licensees 1788 Broadway, New York



SOLAR LAMPS

A discriminating public has voted in favor of Solars—the quality motor lamps.

Backed by 15 years of specialization. Found on more high-grade cars than all other makes of lamps.

A Solar Lamp for every motor need.

WRITE FOR CATALOG

THE BADGER BRASS MFG. CO.
KENOSHA, WIS. NEW YORK CITY

WINTON SIX

Safe to Buy and Good to Own

A thoroughly developed car, manufactured by a company that has long specialized in Sixes exclusively, a company that substantially backs up its product—these elements make the Winton Six safe to buy and good to own. Write for literature.

THE WINTON MOTOR CAR CO.
424 Berea Road, Cleveland, O.

World's First Maker of Sixes Exclusively



Olympic	"four"	\$1500
	Five passenger.	
Majestic	"four"	\$1975
	Five passenger.	
Sultanic	"six"	\$2650
	Seven passenger.	
Sultanic	"six"	\$2500
	Five passenger.	

Jackson Automobile Co., 1207 E. Main St., Jackson, Mich.

Write for catalog.

EISEMANN

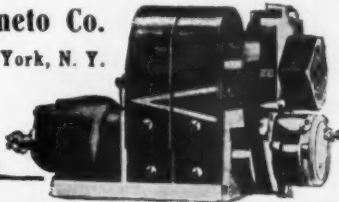
Automatic Spark Control

Quality—not only as to efficiency and manufacture, but in design as well—characterizes all Eisemann Ignition systems. Not only do they insure hot fat sparks at all speeds—but they are simple, accessible and fool proof.

The Eisemann Magneto Co.

225-227 W. 57th St., New York, N. Y.

Indianapolis,
514 North Capitol Ave.,
Detroit,
802 Woodward Ave.



*The Republic Staggard
Tread Tire has been
Christened "the original
effective non-skid tire."
It is—
The Republic Rubber Co. - Jounpstonal*

W
A
R
N
E
R

We Specialize in High-grade Automobile Parts

Transmissions
Steering Gears
Gear Shift Levers
Differentials
Electric Starters

The Warner Manufacturing Co.
TOLEDO, O.

T
O
L
E
D
O

I Want You to HEAR This Musical Auto Horn

I know there isn't anybody who can describe the chime-like signal of the Aermore Horn to you. So I want you to hear it—

The
AERMORE
Exhaust Horn
—the horn harmonious

I want you to write me and I'll tell you where and how you can hear the singing, organ-like tones of the Aermore. Just drop me a postal.

G. V. P. Lansing, President.

Patented
Jan 23, '12.
Aug. 20, '12.

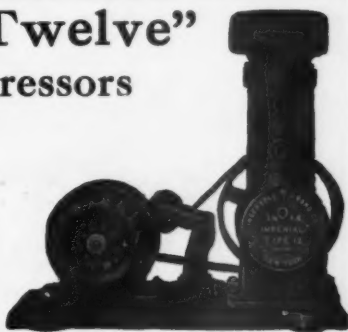
AERMORE MANUFACTURING COMPANY
Dept. 5578, 1536 Michigan Blvd., CHICAGO, U. S. A.



"Imperial Twelve" Garage Compressors

A high-class car equipment deserves high-class garage equipment. The quality of these little compressors is such as to appeal to the most discriminating buyers.

Booklet 608



Ingersoll-Rand Company
New York London

LAUTH-JUERGENS

One, Two, Three and
=Five Ton Trucks=

"Guaranteed for Life"
"Guaranteed Service"

The Lauth-Juergens Motor
Car Company, Fremont, Ohio

You can take a thousand miles of service out of a set of tires by driving them insufficiently inflated over ten miles of road.

Use the New Positive Lock Stop

TWICHELL AIR GAUGE

and save your tires



"TIRE INSURANCE FOR \$1.00"

Simple, Accurate, Durable and Easily Read
For sale by Jobbers, Dealers, Garages, or

The Twichell Gauge Co.

1201 Michigan Avenue

Chicago, Illinois

THE KENTUCKY THOROUGHBRED—"AMES 45"

Long stroke, powerful Continental Motor—Electric (Dynamo) Lights—Self Starter—Left Hand Drive—Full Equipment—"Amesbilt" Bodies and Tops. A combination of power, speed, endurance and graceful lines. Price, fully equipped, \$1,635. This is 1913's most remarkable car value. Backed by a reputation of 30 years, it will win you from the first inspection. We have a most liberal proposition for good, live agents. Send for catalog today.

Ames Motor Car Co., Owensboro, Ky.



Model 5-A \$1700
Touring Car Fully Equipped

People who demand POWER, ENDURANCE, LUXURY and SAFETY in a motor car, drive the time-tested GEARLESS TRANSMISSION CARTERCAR. Presented in four excellent models \$1600 to \$2000.

Electric Cranking and Lighting


Cartercar Company, Pontiac, Michigan
Branches: New York, Detroit, Chicago, Kansas City, Atlanta



Borland Electrics

Agency territory is now being offered to those reputable and well-equipped dealers who are as particular about selling the best as we are about making it.

The Borland-Grannis Co.
Executive offices and factory
310 E. Huron St., CHICAGO



Stands for a Vitality in a Truck

Chase Trucks have the ruggedness of staunch single parts and the efficiency of a perfectly organized whole. Vitality is one reason why we sold more trucks last year than any other manufacturer in the country.

A copy of some profitable literature awaits your request. Ask for your Copy F-5 now.

6 Efficient Models **Every Style of Body**
Capacities 500 to 4000 Lbs.

Chase Motor Truck Company
303 So. West St. Syracuse, N. Y.

Cross-Rolled Steel Springs Cut Up-Keep

In this new process, the steel is worked both longitudinally and transversely. So we get superior strength, toughness, resiliency. We use this process exclusively in our Chrome-Vanadium Brand of Springs. Find out more about them. It will make a tremendous difference in the riding qualities of your car.



In five years we have not had one Cleveland-Canton Chrome-Vanadium Spring returned to us by reason of breakage or settling. Let us send you full particulars.

Best Grade—Chrome-Vanadium
Next Best—Special Analysis

The Cleveland-Canton Spring Co., Canton, Ohio, U.S.A.

SCHAFER BALL BEARINGS

MADE IN GERMANY SOLD IN AMERICA

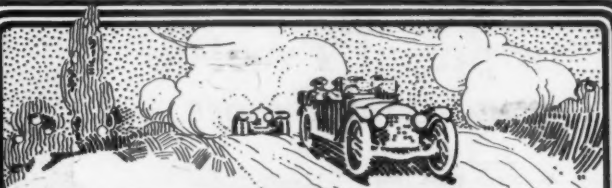


When you buy SCHAFER BALL BEARINGS you are not experimenting because SCHAFER BALL BEARINGS have for years been recognized as the standard of bearing quality. They are made in Germany of the best steel, and are now in universal use throughout the world.

BARTHEL & DALY

42 BROADWAY

NEW YORK



RAYFIELD

CARBURETOR

More power - Less fuel - Wider range

FINDEISEN & KROPF MFG. CO.
21ST & ROCKWELL STS., CHICAGO, ILL.

Wasting Tire Money That's what you're doing when you allow water and sand to work into the fabric through small cuts and bruises, rotting them and causing blow-outs.

THE GIBNEY Eleck-Trick Vulcanizer

seals these cuts and makes tubes and tires run double and treble the usual time

Easy to Operate—It Operates Itself

An illustrated book, telling how to double the life of your tires, awaits your request for it.

JAMES L. GIBNEY & BRO.

215-217 North Broad Street, PHILADELPHIA, PA.
248-252 West 54th Street, NEW YORK CITY

Get acquainted with the standardized "Cole"

the car that is writing gasoline history.
Learn what the

**Cole franchise for
dealers**



will mean to you if you happen to be located in open territory.

Cole Motor Car Co. of Indianapolis

MARMON

"The Easiest Riding Car in The World"

Marmon "32"

Four cylinders, 32-40 h. p., 120-inch wheel-base, electric starting and lighting system, left-hand drive, center control, nickel trimmings, with newest body types to meet every requirement and corresponding equipment.

\$2,850 to \$4,100

Marmon "48"

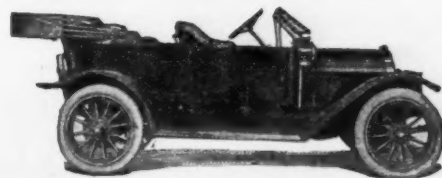
Six cylinders, 48-80 h. p., 145-inch wheel-base, electric starting and lighting system, left-hand drive, center control, nickel trimmings, with body types to meet every requirement and corresponding equipment.

\$5,000 to \$6,350

Detailed Information on Request

Nordyke & Marmon Company
Indianapolis (Established 1851) Indiana

"Sixty Years of Successful Manufacturing"



Marathon Automobiles

America's most comprehensive line. Every car completely equipped. 3 sizes chassis—10 body styles. Price range from \$875 to \$1800

Write for Catalogue M-A

MARATHON MOTOR WORKS, Nashville, Tenn.

United States Tires
are good tires

They cut down tire bills

Dorris
Built to last

THE SILENT CAR

BUILT TO LAST

Our agency proposition will interest you. Write for it.

DORRIS MOTOR CAR COMPANY
100 S. Sarah Street St. Louis, Mo.

Schacht

THE CAR THAT CAPTURED FIFTH PLACE AT INDIANAPOLIS, MAY 30TH

Here is Model "NS"—Electric Starter, Electric head lights, side lights and tail lamp operated with generator and storage battery. 36 x 4 demountable rims with one extra rim, folding zig-zag wind shield, trip speedometer, aluminum adjustable ventilator in windshield base, robe rail, foot rail, tire iron, horn, pump, all tools, jack and tire repair outfit. Price \$1850. Send for dealers' proposition.

THE SCHACHT MOTOR CAR COMPANY
2921 Spring Grove Avenue
Cincinnati, Ohio

\$1850

Is Electricity Cheaper than Gas Light?

How much does a battery cost? How long are batteries lasting? How much do other repairs and replacements cost?

The average user of Prest-O-Lite pays \$10 a year, or less, for light.

If any editor, or any advertiser, claims that electric lights cost less to use than Prest-O-Lite, you can easily prove that he is either ignorant or worse.

If you want the facts, write us.

The Prest-O-Lite Co., 233 East South St. Indianapolis, Ind.

The Weber Turntable

An Indispensable Convenience for Public or Private Garages

Turns in a Very Short Radius. Worth Its Weight in Gold.



Saves Time, Space and Overwork. Ideal for Unloading Cars at Railroad Depots.

LIST PRICES

- No. 1—20 inches square, 3-inch wheel, 1½-inch face; weight, 70 pounds per pair. Price, per pair.....\$20.00
- No. 2—27 inches long, 3-inch wheel, 1½-inch face; weight, 60 pounds per pair. Price, per pair..... 15.00
- No. 3—31 inches long, 3½-inch wheel, 1½-inch face; weight, 75 or 80 pounds per pair. Price, per pair.. 20.00

Will take all size cars, especially for large cars.

The above prices f. o. b. New York City, Muncie, Ind., or Colorado Springs, Col.

Send for our latest catalogue; sent only to dealers.

THE MOTOR CAR EQUIPMENT COMPANY
55-C Warren Street Sole Sales Agents New York City



Makes possible the use of airless tires without sacrifice of easy riding.

Doubles the life of any set of tires.

Increases life of motor and adds to the mileage per gallon of gasoline or per charge of electricity.

Makes any car ride like a cradle.

TRY THEM AT OUR RISK

Supply Dealers and Garage Owners: Write for our agency proposition.

The Ideal Steel Wheel Company
1069 First National Bank Bldg. Cincinnati



THE THOROUGHbred CAR

*Electric Self-crinking, Electrically Lighted
Four Forward Speeds*

"Six Thirty-six" Touring Car and Roadster, \$1850
Model 30 Touring Car..\$1350 Model 30 Roadster..\$1250

LIVE WIRE DEALERS
WRITE FOR UNALLOTTED TERRITORY

HERRESHOFF MOTOR COMPANY
Detroit, Michigan, U. S. A.

"VULCAN" SPRINGS

THE GOOD KIND



When next you are needing Automobile springs, we ask you to consider the Vulcan — a thoroughly good spring.

Stock on Hand to Fit:

Ford	Maxwell	Hudson
Overland	E. M. F.	Chalmers
Buick	Flanders	Oakland
Reo	Hupp	R. C. H.
Cadillac	Regal	Everett

JENKINS MFG. COMPANY

118 N. Third St.

ST. LOUIS, MO.

The Kinsey Manufacturing Company, Toledo, Ohio

MANUFACTURERS OF AUTO PARTS

KINWOOD RADIATORS, FENDERS,
KINWOOD OILERS, GASKETS,
KINWOOD STEEL FRAMES,
ETC., ETC.

SPECIAL METAL STAMPINGS

Pullman 1914 ANNOUNCEMENT

Interesting to Dealers
Will soon be made.
Write for details.

PULLMAN MOTOR CAR CO.
York, Pa.

Model Motors



Afford the utmost in reliability and power—with the least weight and fuel consumption. You can add much value to your car by using the Model Motor. We make them better and at less cost than you can, because we specialize in motors and power units. Write us for facts.

Model Gas Engine Works
PERU, INDIANA

SALISBURY

AXLES WHEELS
TRANSMISSIONS

Salisbury Wheel & Mfg. Co.
JAMESTOWN, N.Y.

"The Advantage of Get-at-ability"
Signalizes the

"LITTLE SIX"

BUDA
MOTOR

"The Part That Sells The 1914 Car"

3 3/4" bore x 5 1/4" stroke

with Special Oiling Device, etc., of the famous BUDA "FOURS."

BRANDENBURG & COMPANY

1108 S. MICHIGAN AVE.
CHICAGO, ILL.

57TH AND BROADWAY
NEW YORK, N. Y.

FORD BUILDING
DETROIT, MICH.

Safety First

Take no chances on Slippery Pavements and muddy roads.

Equip all Four tires with

Weed Anti-Skid Chains

Universally used—Increasing demand—Easily handled—No dull season—No dead stocks.

Sold by all Reputable Dealers

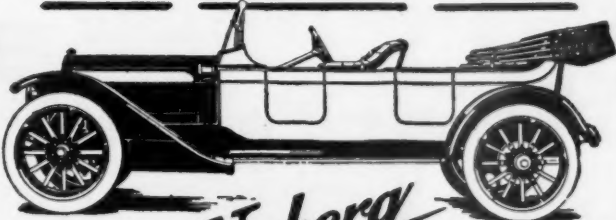
WEED CHAIN TIRE GRIP COMPANY, NEW YORK

TIMKEN AXLES & BEARINGS

"Modern Engineers insist on Timken Gears"



Your Motor Car!



Electric Starter
Electric Lights
Center Control
Complete Equipment

Nyberg SIX \$2000
FOUR \$1650

NYBERG AUTOMOBILE WORKS

Northern Factory
Anderson, Indiana

Chicago Branch
3437-3439 Michigan Ave.

Southern Factory
Chattanooga, Tenn.

MICHENER'S Gasoline Saver and Primer GUARANTEED TO SAVE 25% GASOLINE



This Gasoline Saver is a simple device controlled by an adjusting rod on the dash or steering post. Regardless of low speed or weather conditions, it admits the "just right" amount of auxiliary air consistent to a mixture of highest efficiency. By breaking up and mixing the gasoline globules with sprays of air, it proves a fuel economizer as well as a power producer. It pays for itself many times over in the gasoline it saves you and in the added service it gives your motor. With this device you can prime your motor when it offers any difficulties in starting by simply pouring some gasoline in the bowl of the Gasoline Saver, and giving the valve a small opening before cranking. This method of priming is infallible. It is the surest engine starter known. Use your motor as a brake when coasting down hill. Close the throttle and open the air valve. It feeds the motor pure cold air, saving gasoline, cooling the cylinders and saving the brakes. These are but a few of the many advantages the Gasoline Saver offers. Let us tell you about its other features just as important. Made for right or left side.

Dash Control, \$5.00 Steering Post Control, \$6.00

E. S. MICHENER, Washington St. New Castle, Pa.



EXECUTIVE & SALES OFFICES
DETROIT, MICH.

KISSELKAR TRUCKS

Complete line of commercial vehicles—all type bodies—special bodies designed. Reserve power, low fuel cost—sizes to give economical service under any conditions.

1500 lb., 1, 2500 lb., 2, 3, 4, 5 ton trucks.

KisselKar Service keeps down operating costs. Write for big special truck catalog illustrating many models.

Kissel Motor Car Co., 121 Kissel Ave., Hartford, Wis.

RHINELAND BALL BEARINGS

"INSURANCE FOR
BUILDER AND USER"

RHINELAND MACHINE WORKS CO.
142 WEST 42ND ST ----- NEW YORK

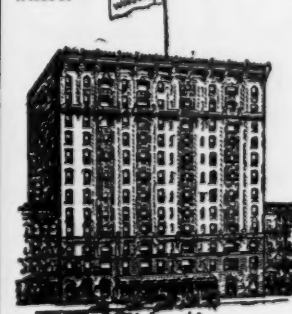
Corcoran Lamps

GAS, OIL, AND ELECTRIC

You
Can
Walk
From
There
to
Any-
where.

THE WOODSTOCK The Hotel of Comfort

43rd St., Just East of Broadway, New York



Our new addition is ready for occupancy. We now have 360 rooms with 265 baths. Write us for descriptive folder with typical floor plan and rate card. Wire for reservation at our expense.

Rates

From \$2.50 to \$4.00 Per Day

W. H. VALIQUETTE
MANAGER

Also The Berwick, Rutland, Vt.



**M^cCUE
WIRE
WHEELS**

**Add a Big Percentage
of Tire Mileage**

Strong, Resilient, Indestructible

These wheels are equipped with  Standard Spokes, made by the Standard Company of Torrington, Conn.

THE M^cCUE COMPANY
Buffalo New York

Oakland

The Car with a Conscience

OAKLAND MOTOR CAR CO.
PONTIAC MICHIGAN

Four & Six
Cylinders
\$1000.
to
\$3000.
Write for
Literature




Patented

Manufacturers of 1913 Models: Don't omit a SPARKS-WITHINGTON Fan from your 1913 specifications. Our One-Piece blade, ball-bearing, radiator fan assemblies cool the motors of more high-class cars than any other fan on the market. There's a reason. SPARKS-WITHINGTON Fans deliver the greatest volume of air with the least H. P. consumption of any fan obtainable. Furthermore, their one-piece construction is positive insurance against blades which loosen, become detached and fly off. Undoubtedly one of our ten standard models is just what you have been looking for. Catalogue and detailed blue-prints on request. Get in touch with us.

The Sparks-Withington Co.
JACKSON MICHIGAN - WALKERVILLE CAN.

HAYWOOD STEAM VULCANIZERS
THE PROFIT MAKING PLANTS

The vulcanizing system that DOES NOT use air bags. **SOLID PADS and HEAVY CLAMPS** are the means through which pressure is generated.

Plants from
\$25 to \$500

Write for Catalog B.
HAYWOOD TIRE & EQUIPMENT COMPANY
524 N. Capitol, Indianapolis, Ind.



**BOYCE
MOTOMETER**
PAT'S PEND'G

Great Indianapolis Race

Watch for the Little Round MOTOMETERS on the Radiator Caps of the Contesting Cars.

Attach a MOTOMETER heat indicator to your radiator cap and know when your radiator needs water or your motor needs oil!

THE MOTOMETER CO., Inc.
1788 Broadway, New York
Chicago, 1822 Michigan Ave.

(Front View) (View from Seat)




Western Electric
PITTSFIELD
IGNITION APPARATUS

will prove its high quality in service. Send us a trial order for any of the apparatus illustrated.

Write our nearest house today.

Manufactured by
PITTSFIELD SPARK COIL CO.

Distributed by
WESTERN ELECTRIC COMPANY

Offices in all principal cities






PERFECTITE

*A Waterproofing Compound
in a Semi-solid Form*

The Best Waterproofing for Auto Tops on the Market


Dealers Write for Territory To-day.

Price Fire and Water Proofing Co.
POUGHKEEPSIE, N. Y.

Practical Gas Engineer
By
E. W. LONGNECKER

Twelve years' constant experience with Hydro-Carbon Engines. How to start, how to operate, and how to care for all classes of explosive motors or engines using gas, gasoline or similar fuels. A full and exhaustive chapter on electric and other systems of lighting. Every line tells something. Every page full of interest. A book of 172 pages, neatly bound in cloth. Sent postpaid on receipt of price, \$1.00.

THE CLASS JOURNAL CO.
910 S. Michigan Ave., Chicago



The Buyer's Guide

A Directory for the Guidance of Motor Age Readers

Counter-Balanced Ball-Bearing

AUTOMOBILE TURNTABLES

BOOKLET ON REQUEST. AGENTS WANTED
T. C. BEACH AUTO-TURNTABLE CO.
313 Lansing St. St. Johns, Mich.

Automobile, Motorcycle and Bicycle Supplies

Ask for catalog "M"
Dealers only

THE BECKLEY-RALSTON CO.
Mich. Ave. & Randolph St., Chicago



AUTOMOBILE TOPS

Write for catalogue and prices.
We can save you money.
BUOB & SCHEU, Court & B'way, Cincinnati, O.

DEALERS

Have you received our new 1913 auto supply catalogue? Full line new goods and new prices.

Prompt shipments—our policy

Chicago Automobile Supply House
1355 So. Michigan Boulevard, Chicago

ESTABLISHED 1844

SCHRADER UNIVERSAL VALVES

TRADE MARK REGISTERED APRIL 30, 1895

The Standard American Valves for Automobile, Bicycle & Vehicle Tires

Manufactured by
A. SCHRADER'S SONS, INC.
28-32 Rose Street New York, U. S. A.



F.E.P.S. CARBURETOR

"A Giant in Power — A Miser in Fuel"

25% to 50% more mileage

Write for illustrated descriptive booklet.

Schoen Jackson Company, Media, Pa.

R.I.V. BALL BEARINGS

R.I.V. 1771 Bway NY

Wanted Men

Who own cars, to act as agents for Trumbly Tops, Seats, Covers and Jiffy Curtains.

TRUMBLY AUTO TOP AND EQUIPMENT COMPANY
1467-69 Michigan Ave., Chicago



THE LITTLE STEERSMAN

MODERN AUTO APPLIANCE CO.
Chatham, N. Y.

A helical spring made of oil tempered steel wire, attached as illustrated, makes any car easier to control and helps prevent accidents. You should have one. Ask your dealer or write for full information.

If You Need Parts And Accessories

you will find over three pages of advertisements of all kinds of motor car parts for sale in the Classified Section of this issue of MOTOR AGE.

Some of those that are listed are new, others are second-hand, but amongst the large number you can't help but find those you are looking for.

Polarine

FRICION REDUCING MOTOR OIL

Maintains the correct lubricating body at any motor speed or heat.

STANDARD OIL COMPANY
(An Indiana Corporation)

SPROCKETS

Chains and Differential

In Stock or Order
Send for New Catalog
CULLMAN WHEEL CO.
1341 Greenwood Terrace, Chicago

—Buy BETTER Springs—

Guaranteed against breakage and sagging at less price than of car factories.

Freight allowed on 4 or more.

In stock, painted for Ford, Buick, Cadillac, Chalmers, Hudson, Maxwell, Regal, Reo, and others. Send for complete list and price.

NEW ERA SPRING & SPECIALTY COMPANY
247 Jefferson Ave., Detroit

All kinds of AUTOMOBILE SPRINGS



Cut shows TITANIC SPRINGS, which have no breakage. No hole to break at. Absolutely guaranteed. If broken at center will replace and no questions asked. For any car. Take your choice. We make every pattern.

TUTHILL SPRING CO., 762 Polk St., Chicago

AUTO-TOP FABRICS OF EVERY DESCRIPTION

SAMPLES AND PRICES ON REQUEST

L. J. MUTTY CO., Boston

WILLIAMS' VENTILATING WINDSHIELD

20th Century Motor Car Supply Co.
South Bend, Ind.

NATIONAL POWER PUMPS

"MADE TO WEAR AND PUMP FRESH AIR"

The only spark plug pump which does not fill your tires with gas. Compare and test it with any other pump on the market and we will get your order. Write for complete description today.

Made by
THE NATIONAL MOTOR SUPPLY CO.
1919 EUCLID AVE., CLEVELAND, OHIO

NEW CATALOG 300 PAGES Now Ready

MOTOR CAR SUPPLIES
MOTOR CYCLE SUPPLIES
MACHINISTS' AND BICYCLES

WHOLESALE ONLY DEALERS GET YOUR NAME IN

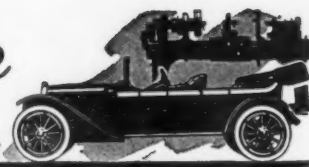
MOTOR CAR SUPPLY COMPANY
1451-1453-1455 Michigan Ave., Chicago



The Clearing House

of the Motor Car Industry

For Second-hand Shop Equipment • Used Cars • Parts and Accessories



1" one time, \$4.50; 2" one time, \$8.75; 3" one time, \$13; 4" one time, \$16.75. Write for rates of larger spaces and longer terms.

Peerless Auto Top Dressing

Waterproofs leaking mohair, duck and canvas. Makes old tops look like new.

1 gal. \$3.75 ½ gal. \$1.98
¼ gal. \$1.04

Peerless Leather Top Dressing

A preserver for all rubber, leather and pantasote. Does not stiffen or harden the top.

1 gal. \$3.50 ½ gal. \$.98
¼ gal. \$1.85 ¼ gal. \$.51

Peerless Lining Dye

For dyeing linings of all tops and curtains a black, uniform color.

1 gal. \$3.00 ½ gal. \$.85
¼ gal. \$1.60 ¼ gal. \$.45

Peerless Back and Cushion Dressing

Renews and softens leather seats and cushions. Will not crack, chip or peel, wash or rub off.

1 gal. \$3.50 ½ gal. \$.98
¼ gal. \$1.85 ¼ gal. \$.51

Peerless Extra Fine Black Japan

Air drying with a high gloss finish on lamps, radiators and fenders. Will not crack, chip or peel.

1 gal. \$3.75 ½ gal. \$1.04
¼ gal. \$1.98 ¼ gal. \$.54

Peerless Fender Japan

Heavy bodied, air drying. No primer or undercoat required.

1 gal. \$3.75 ½ gal. \$1.04
¼ gal. \$1.98 ¼ gal. \$.54

Peerless Extra Fine Black Baking Japan

For brass, nickel or iron. Bakes to a high gloss, egg shell gloss or dull finish that will not crack, chip or peel.

1 gal. \$3.75 ½ gal. \$1.04
¼ gal. \$1.98 ¼ gal. \$.54

Ask your dealer and jobber, or send direct to us

THE COLUMBUS VARNISH CO.
COLUMBUS, OHIO

TIRES—TIRES

All New 1913 Stock

Direct from leading tire manufacturers

WHILE THEY LAST

Size.	Casing.	Tubing.	Reliners.
28x3	\$ 7.20	\$1.00	\$1.80
30x3	7.65	1.95	1.90
32x3	7.80	2.05	1.95
30x3½	11.00	2.70	2.60
32x3½	12.00	2.90	2.65
32x4	15.70	3.60	2.80
33x4	16.00	3.70	2.85
34x4	17.25	3.80	2.90
35x4	17.50	3.90	2.95

C. O. D. orders sent same day as received upon receipt of 10 per cent, subject to your examination.

PARA AUTO TIRE CO.

Phone Calumet 2814

1419 MICHIGAN AVE. CHICAGO

GUARANTEED Radiators for all Cars

The following is our stock list of radiators for the cars mentioned subject to immediate shipment. Compare our prices with other lists.

Ford Model "T"	\$18.00
Buick 10-32-33-14	27.50
Buick F-16-17-19-26-27-28	35.00
Buick 38-39	42.50
Hudson 20	33.00
Chalmers F-40	30.00
Lion 40	25.00
Warren 40	28.50
E-M-F 30	30.00
Flanders 20	30.00
Brush A-B	17.00
Anhut	15.00
Northern C.	32.00
Wayne 30	35.00
Special 40 H.P.	15.00

Terms: One-third cash with order, balance with order.

When Ordering State Year

Autoparts Manufacturing Co.,
453 Trombly Avenue Detroit, Mich.

An Exceptional Opportunity

The owners of a manufacturing site comprising over two acres of land having railroad connections and river frontage, located in the heart of the Pittsburgh district, practically new steel frame buildings, power plant, etc., desire to sell or would consider consolidating with an established business requiring additional space and facilities which could be shown to be profitable and susceptible of development. Address W. W. Noble, Westinghouse Bldg., Pittsburgh, Pa.

Special or Contract Work

and development of new ideas will receive our prompt attention. We have an entirely new equipment of turret lathes, broaching machines, worm and worm gear machines, lathes and other necessary tools, so that large contracts can be handled to advantage by us. Send blueprints or samples of articles you want manufactured, and we will give you figures on such articles, ready to ship.

UNIVERSAL MANUFACTURING CO.

1204 18th Street
RACINE, WISCONSIN

APCO—FORD SPECIALTIES

There are forty of them
FREE CATALOG

AUTO PARTS CO., Providence, R. I.

YOU HAVE A LOCK ON YOUR HOME.
WHY NEGLECT YOUR CAR?

The BLACKBURN Autolock Switch

is positive insurance against thieves and joy riders. Yale key for plug. No extra operations, no rattle, no bother. Installed on your car for \$5. Money back guarantee.

At Your Dealer or

Blackburn Specialty Co.

1134 Prospect Ave. S. E., Cleveland, O.

Real Bargains

Windshields (any finish), \$9.
Windshields (for Ford cars), \$8.50.
34x3½ Q. D. Wheels, \$10 set.
E-M-F 30 Dashes, \$1.
E-M-F 30 1910 Frames, \$10.
E-M-F 30 Rear Springs, \$2.50.
Running Board Irons, per pair 50c.
Flanders 20, 4-passenger Tops, \$8.
Buick 10 Surrey Tops, \$9.
Side Lamps, black and brass, per pair, \$3.25.
Spring Clips, 10c.
Puritan Gas Tanks, Model B, \$5.
Splitdorf Magnetos, type X, with box coil, \$20.
Herreshoff Fenders, per set \$10.
Spark Plugs, 33c.

Autoparts Manufacturing Co.,
453 Trombly Avenue, Detroit, Mich.

Modern Up-to-Date Machine Tools LATHES

(6) 18"x8'
(4) 16"x6'
(4) 14"x6'
(2) 12"x6'

All standard makes, back geared, hollow spindle, compound rest.

DRILLS

10"-12"-20"-22"-26" Back Geared
All makes

MILLING MACHINES

No. 1 Garvin Universal
No. 4 Brown & Sharpe Plain

BORING MILLS

32" Bullard Vertical with turret head
Fitchburg Horiz. with 3" bar

SHAPERS

20" Steptoe 24" Hendey
26" Juengst

TURRET LATHES

¾" to 2" capacity, plain and back geared

ALL MACHINES GUARANTEED
HEADQUARTERS FOR BARGAINS

Herman L. Winterer

908-910 Beach Street Philadelphia

Annular Ball Bearings REGROUND

We carry a complete stock of re-ground bearings of all makes and sizes, for immediate exchange.

Get Our Prices
Ahlberg Bearing Co.
2640 Michigan Avenue
CHICAGO, ILL.

1790 Broadway New York City 806 Woodward Ave. Detroit, Mich.

Stop the Auto Thief

You can perhaps realize on your insurance policy—if you have one—if your car is stolen, but what of the 60 days waiting for proof, etc., and you without a car? If your car is equipped with a

COMBINATION IGNITION LOCK

you are absolutely insured against theft. Inexpensive; applied to any car; simple; no keys; works like the dial of a safe. Ask for details and catalog.

Auto Combination Mfg. Co.
1467 Michigan Avenue CHICAGO

A Buell High-Duty Whistle on your car will make you the envy of the town. Everybody who has one is more than pleased. Looks so good to car owners that anybody can make money selling them. Installed in 5 minutes, with wrench only. Blown on a new principle, giving it the power of a locomotive whistle. Our agencies are valuable. Write for circular and cut.
Buell Auto Company, 6051 Cottage Grove Ave., Chicago.

For Sale by **Chas. Molitor Machinery Co.**

215 S. Clinton St., Chicago, Ill.
15"x 8' Bradford Lathes.
20"x10' Springfield triple-gear lathes.
24"x 8' Lodge Shepley quick change gear lathes.
B. L. No. 1 Universal Grinders.
No. 1 1/2 Brainard Universal Miller.
1 1/2" Pratt & Whitney modern screw machine.
500 other different machines, etc.

LOZIER

A LOZIER FOR \$3,250! (A Self-Seller)

A completely equipped Light Six which will meet the big demand for a really high-class car of this type. Dealers from coast to coast who have investigated the LOZIER "Self-Seller" say it is the greatest motor car value they have ever seen.

Some good territory is still open

Write or wire for our proposition

LOZIER MOTOR CO., DETROIT

Pendleton Gear-Locking Device FOR ALL AUTOMOBILES



A Perfect Preventative Against Theft

Absolutely guaranteed against filing, sawing or cutting in any manner while attached to the car.

In ordering state make, year and model of car

\$1.50 Delivered to any part of U. S. without padlock.

HALLIWELL CO.

Sales Agents
408 W. Pico St., Los Angeles, Cal.

AUBURN 1913

"Rides Like a Pullman—Pulls Like a Locomotive"

38 Years' Manufacturing Experience
Built Into Every Model.

Model 33M—Two Passenger Roadster; 33 H. P. long stroke motor 3 1/2 x 5 1/4 — Price, \$1150.

Model 33L—Five Passenger Touring Car; 33 H. P. long stroke motor 3 1/2 x 5 1/4 — Price, \$1150.

Model 40A—Two Passenger Roadster; 40 H. P. long stroke motor 4 1/2 x 5 — Price, \$1650.

Model Six—50—Six-Cylinder Touring Car, 50 H. P. long stroke motor 4 1/2 x 5 1/4 — Price, \$3000.

Send for 1913 Catalog

AUBURN AUTOMOBILE COMPANY, Auburn, Ind.

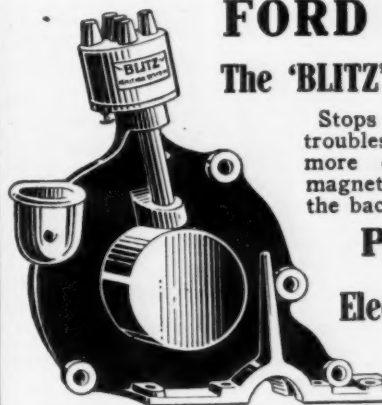
Model 40L—Five Passenger Touring Car; 40 H. P. long stroke motor 4 1/2 x 5 — Price, \$1650.

Model Six—45B—Two Passenger Roadster, 45 H. P. long stroke motor 3 1/2 x 5 1/4 — Price, \$2000.

Model Six—45—Five Passenger Touring Car, 45 H. P. long stroke motor 3 1/2 x 5 1/4 — Price, \$2000.

FORD OWNERS

The 'BLITZ' Ignition System



Stops all of your ignition troubles. Makes your car more efficient. Uses Ford magneto current. Eliminates the back kick.

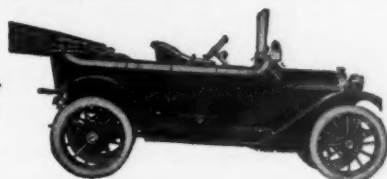
Price \$20.00

**Electrical Specialties
Mfg. Co.**

Omaha, Neb.

The *Detroit*—\$850 FULLY EQUIPPED

Five Passenger Touring Car



25 H. P. Long Stroke Motor

Enclosed Valves, Three Point Suspension, Unit Power Plant, Platform Rear Springs, Full Floating Rear Axle, Left Hand Drive, Center Control, Drop Frame, Large Tires, Complete Ball Bearing Car

BRIGGS-DETROITER COMPANY, 455 HOLBROOK AVE., DETROIT, MICH.
WRITE FOR SPECIFICATIONS

Noiseless—Unlooseable

M & E Grease Cups



Are constructed so that the cap can neither rattle nor be lost. The end (B) of spiral spring acts as a pawl catching in corrugations (A) in the cap. When cap is turned the pawl slips from notch to notch and prevents vibrating loose. They lubricate perfectly. Made in brass or steel—all sizes. Are standard of the world, and used exclusively by the best car manufacturers.

At dealers or write for Catalogue 31 and samples

Merchant & Evans Co.
Philadelphia

New York Chicago Brooklyn Baltimore Cleveland Kansas City Wheeling



CLASSIFIED ADVERTISEMENTS

The Trading Center
of the
Motor Car Industry

MOTOR AGE

Rates—25¢ per line
Minimum Charge \$1.00
6 words to a line

Cars For Sale

A NEW 1913 SIX PASSENGER CADILLAC for sale. Car has been run but 300-miles. Fully equipped, including seat covers; speedometer; glass front; Hartford shock absorbers; Klaxon Horn; tire pump on engine; extra tire and tube. Not a scratch on the body or tires. Car cost complete \$2385.00. Will sell for \$2100.00. Best reasons for disposing of car. Address, Box D 384, c/o Motor Age. k

A PACKARD CHEAP

1910 Phaeton overhauled this Spring; tires in fine shape; car fully equipped, including Klaxon Horn; Warner Speedometer and clock; seat covers; tire rack and tube case. Address, Box D 385, c/o Motor Age. k

A REAL BARGAIN—4-CYLINDER, 50 H.P., 7-passenger, fully equipped Welch-Detroit, like new; only run 6,000 miles; \$1,000. D. Ogden, Columbus, Ind.

A 7 PASSENGER, 40 HORSE POWER White Steamer and one 20 h. p. 4 pass. Both machines like new. Joy valve engines, kerosene burners, operating for one-half cent per mile. Address Box D 151, c/o Motor Age. w

BUICK RUNABOUT FOR SALE.

I offer for sale my 1912 Model 28, two-passenger Gray Buick Runabout, fully equipped, top, shield, demountable rims. Run very little, condition guaranteed. Sale at a bargain. Address 41 Front St., Port Jervis, N. Y. t

FAL CARS AND REPAIRS

F. A. L. Auto Co., 4052 Princeton Ave., Chicago. Phone Drover 1712.

FOR SALE

1912 Abbott Detroit Battleship Roadster, perfect condition, original price \$2250.00, will take for quick sale \$1600.00. Address Box D 373, c/o Motor Age. s

FOR SALE—AUTOMOBILES; ONE LIGHT, open delivery car; one 5-passenger Ford; one 7-passenger Mitchell. These cars in excellent condition and can be seen at the Palace Garage, Iola, Kans.

FOR SALE—DE TAMBLE 5-PASSENGER, 36 H. P. Model 1912, in good condition; run about 4,000 miles. Cost \$1,350; for quick sale, \$750. A. G. Skinner, Newman, Ill.

FOR SALE—ONE 1913, SEVEN-PASSENGER Big Six Lozier, used as demonstrator, run less than 5,000 miles; factory overhauled and repainted; looks as good as new; two spare tires, four spare rims; for \$4,000.

One 1912 4-44 Pullman; run less than 500 miles; factory overhauled, new top, repainted, electric lights, self starter, spare tire; \$1,500.

One 1911 Firestone Columbus in excellent shape, five-passenger; \$800. All cars f. o. b. Louisville.

Louisville Lozier Company,
405 West Broadway, Louisville, Ky.

FOR SALE—PACKARD "30" 1912; FULLY equipped, perfect condition. Cost \$4,700, price \$2,500. Fisher Automobile Company, Indianapolis, Ind.

FOR SALE—WHITE STEAM CARS, VARIOUS models, in excellent condition; also parts for steamer engines and generators. We specialize in steamers. Joseph Libal, 3145-53 N. Halsted St., Chicago.

G. J. G.—SPECIAL RACING MACHINE capable of doing better than 70 miles per hour mounted on English style of wire wheels with Bosch racing magneto and motor modeled so as to have the minimum of friction to the maximum of speed. Equipped with New any make selected of standard tire equipment. Write for Photograph and specifications to G. J. G. Motor Car Company, White Plains, N. Y.

THE PLACE TO SAVE MONEY WORLD'S LARGEST DEALERS

	Reg. Price.	Our Price.
New 1912 R.....L 5 passenger, fully equipped....	\$1,250	\$700
New 1912 R.....L 7 passenger, fully equipped....	\$1,750	\$885
New 1912 roadsters, fully equipped.....	\$1,425	\$875
New 1913 K.....roadsters, fully equipped.....	\$1,390	\$875
New 1912 electric coupes, 3 & 4 passenger.....	\$2,500	\$1,250
NEW S.....N TRUCKS.		
1½ ton.....	\$2,500	\$1,300
3 ton.....	3,500	1,950
4 ton.....	4,200	2,300
5 ton.....	4,700	2,600

NEW ENGINES.

3 cylinder Reliance, 45 h. p.....	\$ 95.00
4 cylinder Reliance, 60 h. p.....	125.00
3 cylinder Delahaye vertical, 14 h. p.....	60.00
4 cylinder Mora, 20 h. p.....	125.00
4 cylinder Maxwell, 20 h. p.....	175.00
4 cylinder Chester, 25 h. p.....	175.00
4 cylinder Buda, 35 h. p.....	200.00
4 cylinder Poss, 25 h. p.....	140.00
4 cylinder Welsh, 60 h. p. racing motor.....	300.00
6 cylinder Herschell-Spellman, 45 h. p.....	350.00
2 cylinder opposed unit power plant.....	85.00

SELF STARTERS.

Disco self starters for 4 and 6 cyl.; regular price \$50; our price, while they last; each.....\$ 7.50

AUTOMOBILE TOPS.

Regular silk mohair tops, side curtains and boots; 5 and 7 passenger; sold everywhere at \$75; our price.....30.00

Price includes fitting.

BODIES.

Our E body; handsome straight line, flush side, five-passenger body, trimmed in highest grade of leather, and upholstered and painted and varnished; ready to set on your car; 34" wide and 94" long. Regular price \$350.00. Our price \$100.00.

Our 7-passenger body of equal quality and latest design; painted in the lead; 35" wide and 106" long. Regular price \$500.00. Our price \$125.00.

AXLES.

Weston-Mott semi-floating axles complete with wheels, \$35.00 per set. Timken full floating axles complete with hubs, \$70.00 per set.

WHEELS.

All sizes in stock, \$12.00 per set.

GASOLINE TANKS.

Round, 20 gallon gasoline tanks, \$6.00 each.

WIND SHIELDS.

All kinds and sizes of automatic wind-shields from \$5.00 to \$15.00 each.

HORNS.

Electric vibrator horns, strong full tone, \$4.75. Motor driven horns, \$6.50.

CARBURETORS.

Many different makes; prices range from \$2.50 each to \$12.50 each.

Rear Axles—Weston-Mott, geared 4 to 1; complete with wheels. Regular price, \$120.00. Our price, \$35.00.

Steering Column—Complete; \$15.00 each.

Large auto trunks, \$6.50 each. Trunk racks, \$1.50 each.

WIND SHIELDS.

One piece roadster shields. Regular price, \$25.00. Our price, \$12.50 each.

All brass folding wind shields, \$8.00 to \$15.00 each.

RADIATORS.

See our special ad under radiator classification in the middle of the center column on page 134.

MAGNETOS.

Bosch DU 4 magnetos.....\$30.00

Bosch D6 magnetos.....35.00

Splitdorf dual system magnetos.....25.00

Volta high tension magneto.....15.00

J & B 1 cylinder, high tension.....6.50

Splitdorf 2 cylinder; complete; \$15.00 each.

Splitdorf 4 cylinder; complete; \$25.00 each.

Splitdorf 6 cylinder, complete; \$30.00 each.

PRESTO TANKS.

We have just secured a job lot of model "B" tanks filled and complete with brackets. Regular price \$25.00. Our price \$13.50 each.

TIMES SQUARE AUTOMOBILE CO.,
1210-1212 MICHIGAN AVE., CHICAGO.

S. W. Cor. 56th and Broadway,
New York City.

FOR SALE—1911 MODEL MITCHELL RUN- about, new tires, fully equipped, fine condition; only \$350.00. Joseph Libal, 3145-53 N. Halsted St., Chicago, Ill. s

MITCHELLS REBUILT, GUARANTEED. These cars are fully equipped. Call or write for further particulars.

Mitchell Automobile Co.
2334-36-38 Michigan Ave., Chicago.

ONE 16 and ONE 20-PASS. AUTO BUSES. Have been run only a short time. At a bargain.
Beck & Son, Cedar Rapids, Iowa.

OVERHAULED IN A ONE CONDITION 4 cyl. 1909 Rambler 30 H. P. 5 pass. New tires cheap. \$450.00 or will trade in on new light car 5 pass. Address, J. A. A., 2904 W. 3rd St., Duluth, Minn.

THOMAS FLYER RUNABOUT 4-60—IN excellent condition. Must sell to settle estate. Will sacrifice if taken immediately.
E. R. M., 11 No. Harrison St.,
East Orange, N. J.

THREE NEW R-C-H CARS, \$765.00 F. O. B. Detroit. On account change in management, we have been obliged to cancel our order for these cars for our salesmen. They have not as yet been shipped from the factory. American-Lithuanian Knitting Co., Kenosha, Wis. k

THOMAS FLYER RUNABOUT 4-60—WILL sacrifice for cash. Buying touring car.
H. C. Levin,
2160 Broadway, New York.

10 TAXICABS, IN RUNNING CONDITION, at \$300 each. Splendid opportunity for someone wishing to start in this money-making business, requiring but a small investment. The White Co., 2635 Wabash Ave., Chicago, Ill.

1913 CHALMERS 36 TORPEDO—COM- pletely equipped, Klaxon horn and extra tire. Run 3,500 miles, \$1,350 cash. 1206 Myrtle St., Franklin, Pa. h

1912 MOON, 40, 5-PASS., WITH COMPLETE equipment; cost \$2,000; excellent condition; driven less than 5,000 miles; will sacrifice \$800. J. L. F., 27 Thames St., New York.

Parts and Accessories FOR SALE

ATTENTION—HENRY OWNERS

Having purchased the repair business of the Henry Motor Co., we are prepared to fill orders promptly for repairs for Henry cars. Muskegon Automobile Co., Muskegon, Mich.

AUT-O-LITE STORAGE BATTERIES, 6-80; all makes, new and used; \$2.50 to \$9; guaranteed; get bulletin. 4105-7 Cottage Grove ave., Chicago. s

AUTOMOBILE OWNERS

Stop paying high prices for your accessories and supplies.

Tell me your needs and I will "show you."

B. JAY BARRIER,
First National Bank Building,
Cincinnati, Ohio.

AUTOMOBILE BODIES, PLEASURE AND Commercial.

Foredoors for open-front cars.
Write for prices.
Auto Specialty Mfg. Co., 326 E. Market St.
Indianapolis, Ind.

AUTO OWNERS IN SMALL TOWNS.

You can save one-half your tire expense and nearly all your tire trouble by using Security Reliners. Many of our customers run their cars the entire season without blowout or puncture and without spending a cent for tire repairs.

YOU CAN DO IT YOURSELF.

If we have no dealer in your town you can get a trial order at the dealer's price, and make a good profit selling to your neighbors. If you run your own car write at once for our plan.

SECURITY RELINER CO.
301 Spring St., Montgomery, N. Y.
245 W. 54th St., New York.

AUTO WHEELS, DEMOUNTABLE AND Q.

D. rims. The latest and best truck tires. All styles applied on short notice; axles, springs, frames and bearings repaired. Meeker Manufacturing Co., Bell East 383, Home 3105, Dayton, Ohio.

A WHITE STEAMER GENERATOR AND burner, almost new. Will sell cheap. Address Box D 245, c/o Motor Age.

BARGAINS.

Self Starters, Disco, 4 cyl., \$5.00; Kingston Carburetors, new 1 1/4", vertical intake, \$3.00; Steering Gears, Warner, complete, 18" wheel, \$12.00. Automobile Appliance Co., 1712 Michigan Ave., Chicago, Ill.

BRAND NEW 35-40 H. P. FOUR CYLIN- der motors, with fan, pump, clutch, mag- neto and coil. Price \$222.50. Not old, dis- continued models, but up-to-date in every way. F. E. Alford, Goshen, Ind.

CELLULOSIA—BEST SUBSTITUTE FOR glass used in automobile and buggy storm fronts, side curtains, etc. Sheet 20x36 in., 85 cents; 12x20 in., 35 cents, postpaid. Hawes Storm Front Co., Coldwater, Mich.

COIL PARTS—PLATINUM POINTS, CON- tact springs and screws for all makes of coils and magnetos. Largest house in United States for these parts. Write for catalog and price list. The Erie Supply Co., 242-244 Erie St., Toledo, Ohio, U. S. A.

CUT-OUTS

E.M.F., Flanders, Buick, Regal, etc. Com- plete outfit with brass lock, open pedal, \$1.50. Lincoln Machine Shop, Lincoln, Ill.

DETROIT FORE-DOORS

for

E-M-F, Ford and Hudson.
One piece aluminum; immediate shipment subject to inspection.
Detroit Fore-Door Co.

66 Fort St. E. Detroit, Mich.

DISCO SELF-STARTERS.

Only \$12.50. List price, \$30.00. Guarant- eed. Only successful gas starter. Standard equipment on Stevens, Buick, Packard. Great opportunity to have 1913 improvement on your old car.

PARSONS SALES CO.,

1945 Grand Ave., Kansas City, Mo.

DOES YOUR AUTOMOBILE TOP LEAK?

Colman's Waterproof Filler makes mohair and canvas tops rainproof; does not affect the color or texture. Virginia Waterproofing Corp., Arcade Bldg., Norfolk, Va.

DRAGON REPAIR PARTS

We manufacture and keep on hand all repair parts for the Dragon cars. We make a specialty of repairing this machine. Phila- delphia Machine Works; 67 Laurel St., Philadelphia, Pa.

ELECTRIC HORN, \$3.00; \$6.60; STORAGE Batteries, \$7.50.

Fred Allen Auto Supply Co.,
1610 Michigan Ave., Chicago, Ill.

EVERY CAR OWNER SHOULD USE Electric Polishing Cloths. Keeps the New Car from Looking Old and Shabby and Makes the Old Car Look Like New. No. 1 cloth removes all spots and stains; No. 2 cloth gives a hard dry polish that will not gather dust. Saves half the time in wash- ing. Price 50 cts. a set by Parcel Post. Order now.

A. & R. Co., Wallingford, Conn.

E. M. F. PUSH ROD ADJUSTERS

\$1.50 for complete set delivered. Money back guarantee. Auto Parts Co., Providence, R. I.

FORD FAN BELTS, WOVEN COTTON AND silk; outlast six regular belts. Postpaid, 75c. Dealers, write. Angier's, Streator, Ill.

FORD LIGHTING OUTFIT \$5.50

Includes parabolic reflectors, tungsten bulbs, wiring, switch and free delivery. Truscott Auto Supply Co., St. Joseph, Mich.

FORD MODEL "T" 1912. CHASSIS. COM- plete and in perfect running order except body and tires. Make an offer. Willis B. Morrow, Marblehead, Mass.

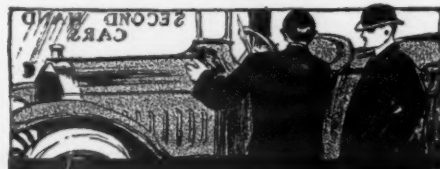
FORD OWNERS: WE WILL GUARANTEE you a saving of 10% to 15% on Moulding, Bumpers, Trunk Racks, Robe Rails, or any accessories. Write us today what you re- quire. The Specialty Co., 2220 Calumet Ave., Chicago, Ill.

FORD OWNERS

A postal brings you our 1912 catalog of 22 necessities for your car. Auto Parts Co., Providence, R. I.

FORD OWNERS AND DEALERS!

You will save trouble and money by in- stallating our timer elevating device. Ford Parts Specialty Co.,
1211 Main St., Richmond, Ind.



A Good Reason

"We do not care to re- peat the advertisement in reference to the Knight car at this time. We sold it through the MOTOR AGE advertisement. That's why."

H. H. W.

FORD OWNERS—YOU CAN INCREASE the life of your tires 25% by fitting your car with Wire Wheels. Will also improve riding qualities of your car and make it up- to-date. Write Racine Auto Parts Co., Box 86, Racine Jct., Wis.

FORD OWNERS—OUR SPARE DEMOUNT- able wheel cures tire trouble on road. Doc- tors attention. Write Angier's, Streator, Ill.

FORD, HUPP AND MAXWELL

Muffler cut-out, machined ready to attach, including lock, open pedal string and cables, \$1.35. Lincoln Machine Shop, Lincoln, Ill. c

FORD T. OWNERS

Foot throttle or accelerators, \$1.50. Lin- coln Machine Shop, Lincoln, Ill.

FORE-DOORS.

Doors made for all makes of cars. Guar- anteed prompt shipment and a very good fit. We have patterns for most every car. F. E. Lortz Co., 9201 Hough Ave., Cleveland, Ohio.

FOR SALE — AUTOMOBILE RUNNING gear complete. Altogether or any part of same. Shaft driven. 4 cylinder engine. Ad- dress, The Heathcock-Rush Machine Co., Jackson, Tenn.

FOR SALE—1 VULCANIZING POT AND boiler almost new. Will sacrifice for \$175, cost \$300.

Colonial Rubber Works,
46-52 E. 28th St., Chicago.

FOR SALE—\$70.00

Four cylinder 4 1/4" x 5" automobile motor, complete with clutch, carburetor and coil, in fine condition. Would be suitable for motor boat. Peter Bros. Mfg. Co., Algon- quin, Ill.

GET BUSY SALE!

Large automobile factory purchased out- right! Everything at a price! Must move at once! Axles, Radiators, Steering Gears, Magnetos, etc. Anything and everything! Send for bargain list.

Puritan Machine Co.,
413 Lafayette Blvd., Detroit, Mich.

GUARANTEED BATTERIES.

6 volt 140 Amperes.....\$16.00
6 volt 80 Amperes.....13.00
6 volt 60 Amperes.....10.00

The Ampvo Battery Co.,
1607 Michigan Ave., Chicago, Ill.

HUPP OWNERS.

Write for our parts list; save you 1 on repair parts.

Autoparts Mfg. Co.,
Cor. Trombley and Orleans,
Detroit, Mich.

I WILL FURNISH RECIPE FOR COM- pounding

Goo Goo Tire Fluid.
Make 10 gallons for what you pay for 2. Money refunded if not satisfactory; recipe \$3.00.

W. J. Snook,
1041 School St., Des Moines, Ia.

IS THE FINISH ON YOUR CAR DULL?

Apply Boyer's Automatic Re-Fin- isher to your Automobile today. To- morrow it will look as though it just came from the factory. Finest thing in the world for dull hoods. One application lasts a year.

Particulars free.

Boyer Chemical Laboratory Co.
2 E. Michigan St., Chicago.

KASTNER TIRE AND RIM CO.,

2112 Michigan Ave., Chicago.

Standard Universal, quick detachable rims in sizes 30x3, 34x3 1/2, 32x4, at \$5.00 a set of four, absolutely new. Also 30-3 one-piece clincher rims at 50 cents each. Send for cut of quick detachable rim and our new rims part catalogue.

KEROSENE FOR AUTOMOBILES

Our new Model B uses successfully half and half mixture lowest grades kerosene and gasoline. Satisfaction guaranteed or money refunded. Greatly increased power; very slow speed on high. Starts easy at zero. Special agents' prices. Dept. B.

The Air-Friction Carburetor Co.,
Dayton, Ohio.

LANDAULET BODY.

For any Straight sill. This body is in A No. 1 condition and will prove a bargain to the first purchaser.

Modern Autop Co.,
607 St. Claire Ave. N. E., Cleveland, Ohio.

LAUGH AT TIRE TROUBLE

Use Standard Tire Protectors. Tire ex- pense reduced two-thirds. Write today for our valuable accessory catalogue.

New York & Brooklyn Auto Supply Co.,

1717-1719 Broadway, New York.

LIGHT—IF YOU USE AN ACETYLENE

Gas Generator on your automobile, motor- cycle, or motorboat, let us tell you about the White-Light Gas Refiner. It will make your generator reliable and transform your treacherous yellow flame into a clear, white, dependable search light. Price \$1.50. Barn- ard Brass Works, Rockford, Ill.

LATEST FORD ROADSTER BODY, \$35.

Tops, curtains included. Mac Innis Bros., Toledo, O.

MACHINE SHOPS AND GARAGE—OUR

WELD IT ALL machines will weld per- fectly any broken casting that has a melt- ing point. Full particulars on Oxy-Acetylene welding machines sent on receipt of your address. Every machine fully guaranteed. H. D. Prose & Co., Wichita, Kansas.

MANUFACTURERS' SALE 50% OFF PURCHASE PRICE.

60 New Ejector Mufflers, each.....\$ 2.50
Frames 112" and 124" W. B., Straight
and Kickup\$12.00 to \$15.00
Frames, unassembled, 112" W. B.,
Kickup 10.00
Wheels, 32 x 3 1/2-34 x 3 1/2, etc., per set
.....\$10.00 to \$15.00
Axles, front and rear, 30 to 50 H. P.
5 Pass. Bodies, rough and leaded, not
upholstered\$10.00
Atwater Kent systems, Broadcloth, odd
trimmings, garage flash sign, showcase,
running board brackets, spring hangers,
starting cranks, rough flywheels, drive shafts
a few auto tops, etc.
Ask us for particulars.
Address,
Box D 364, c/o Motor age.

MONEY FOR FORD DEALERS.

Write Today for Our Agency Proposition.
EDISON STARTERS.
No More Cranking. No More Broken Arms.
The Edison Starts Car From Seat.
Every Ford Owner Wants An
EDISON STARTER.
We Guarantee to Please.
CONSOLIDATED GAS & ELECTRIC CO.
552-554 W. Lake Street, Chicago, Ill.

MORA REPAIR PARTS

We purchased the repair business of the
Mora Company and have in stock repair
parts for all models of Mora cars. Phila-
delphia Machine Works, 67 Laurel St., Phila-
delphia, Pa.

MAXWELL PUSH ROD ADJUSTERS

\$1.50 for complete set delivered. Money
back guarantee. Auto Parts Co., Provi-
dence, R. I.

MR. (FORD) OWNER AND GARAGE MAN
The Townsan Valve Adjuster has a cush-
ion for your valve-stems. Takes away the
click, absolutely silencing the valves. No
screws or burrs to work loose. Saves put-
ting in new push-rods and valve-stems.
They never wear out. Price \$1.50 by mail.
Ask your jobber, or address Townsan Auto
Specialty Co., Mitchell, S. D.

NICKEL PLATE YOUR AUTO TRIMMINGS
with Electro-Knickel. Prevents brass
from tarnishing, iron from rusting. This is
not a silver or mercury wash. We guaran-
tee it plates (without a battery). Price \$1.00,
express prepaid. Write for information.
Gun Metal Finish Co., 313 Powers Block,
Decatur, Ill.

NOW IS THE TIME

TO

BUY SUPPLIES.

Sta-rite, Jr., Spark Plugs.....	\$.25
High Tension Cable.....per foot	.05
Primary Cable .....per foot	.03
Diminishing mirrors.....	2.00
Side Oil Lights.....per pair	3.50
Trunk Racks.....each	1.00
Ford Crank Case Oil Gauge.....	.30
Brass Oil Pump.....	.35
Brass Generators.....each	1.00
Leather starting handle holders, each	.25
Celluloid in sheets to repair storm fronts, curtains, etc. Price per sheet	
20x36.....	.50
Priming Cups.....each	.10
Brass dash air pumps.....	1.00
Foster Shock Absorbers, per set of four.....	6.00
Meco Wrench Set.....	.40
Ford Model T Fenders.....per set	10.00
Tapco Tire-Tone, makes your tires like new, 12 oz. can.....	.20
Pint cans.....	.25
Auto Tops, five and seven passenger	25.00
Five passenger fore-door bodies.....	75.00
Weston-Mott semi-floating axles, per set.....	40.00
Timken full floating axles.....per set	65.00
Artillery type wood wheels, all sizes, per set.....	10.00
Four cylinder Herreshoff motors, Unit Power Plant.....	160.00
Four cylinder Northway type motors, new.....	140.00
Selective sliding gear transmission..	35.00
Get our new circular on engines, transmis- sions, fenders, radiators and supplies.	

AUTO PARTS CO.,
513-31 Jackson Blvd.,
CHICAGO, ILL.

**OXY-ACETYLENE WELDING AND CUT-
ting Machine.** The Admiral Welding Ma-
chine is built by men who know; large ca-
pacity; self-generating; portable; perfect for
all classes of work. Send for booklet,
"Welding and Cutting." Price, with Weld-
ing and Cutting Torches, all Filler Rods,
Fluxes, Chemicals, etc., ready to begin earn-
ing big money, \$250.

We do expert welding; prices right.
Admiral Welding Machine Co.,
1331 Walnut St., Kansas City, Mo.

PET COCK—FOR INSTANTLY CLOSING
the gasoline line. Fits standard carb-
uretor coupling. Easily attached. Mailed for
60c and dealer's name. Discounts to the
trade. Will save its cost every month, be-
sides the convenience. Address Specialties
and Tire Department, Wyman Motor Car
Company, Columbus, Ohio.

RADIATORS—NEW GUARANTEED GOODS

Ford, Model T.....	\$16
Buick Model 10.....	22
Buick Model F.....	25
Chalmers-Detroit.....	20
Everett.....	20
Stoddard-Dayton.....	25

Any other make required at equally low
prices.

Times Square Automobile Co.,
1210-1212 Michigan Ave., Chicago.



More Than Satisfied

"Please change our ad-
vertisement to read as per
enclosed matter. Run until
further notice. We have
steadily secured excellent
results from our ads in
MOTOR AGE and are
more than satisfied."

L. D. S.

RADIATORS

Built to Order for All Cars. Copper, Fin and
Tube Type.

\$5.00 Trade Allowance for old radiator
shipped in F. O. B. Detroit.

Ford Model T.....	\$22.00
Ford Model R. S. & N.....	28.00
Hupmobile 1910-1911.....	28.00
Hupmobile 1912-1913.....	38.00
Warren 1910-1911-1912.....	35.00
Packards to sample, \$50 to.....	65.00
E. M. F. 30.....	35.00
Flanders 20.....	30.00
Patterson 30.....	35.00
Buick 10-14-32-33.....	30.00
Buick 16-17-19-26-27-28.....	35.00
Hudson 20.....	32.00
Hudson 33.....	40.00
Cadillac 30.....	35.00
Paige 1910-1911.....	28.00
Paige 1912.....	30.00
DeTamble 1910—a few.....	15.00

Aeroplane radiators to Blue Print.
1,000 Standard motor cycle spark plugs—
while they last, 25c each.

17 in. Niagara folding machine.....	\$12.00
One set 30x2 slip rolls.....	20.00
34 in. P. S. & W. square shears.....	35.00

Terms cash with the order or 1-3 with
all shipments C. O. D.

HURON RADIATOR & LAMP COMPANY,
253-255 Jefferson Av.,
Detroit, Mich.

REPAINT YOUR CAR YOURSELF—WITH
our materials and full instructions, you
can repaint your car as well as a regular
painter and save from \$25 to \$50, depending
on its size. Previous experience unneces-
sary. Latest colors. Write today for full
information and color cards. We also make
Liquid Gun Metal, the National Brass
Enamel. \$1 a can, express prepaid. The
only articles of proven merit for lamps,
radiators, etc. No polishing. Arsenal Var-
nish Co., Automobile Dept., Rock Island, Ill.

STEVENS AUTO TIRE VALVE

Adopted by Ralph De Palma, winner of
the Vanderbilt Cup at Milwaukee, 1912. Can
be attached instantly without any expense
to any inner tube stem on any car. Saves
one-half the time and labor necessary to in-
flate tires by any other method. Easily ad-
justed. Warranted not to leak. 200,000 in
use. Send \$1.00 for set of four. Try them 30
days and if not satisfactory money will be
cheerfully refunded. Stevens Manufacturing
& Supply Co., 504 Fisher Bldg., Chicago.

TOPS BUILT, RECOVERED AND RE- paired.

C. G. Meyer & Son, Tiffin, Ohio.

TOURING, ROADSTER, RACING BODIES.

Seats, special and stock sizes. Radiators,
hoods, tanks and fenders for any car. Get
our prices.

Auto Sheet Metal Works,
1534 Michigan Ave., Chicago.

**TWO CYLINDER GASOLINE AUTOMO-
bile Engine, \$25; Three Speed Transmission
and Clutch, \$15, Complete Front and Rear
Axles, \$20. Rowe, Lansdowne, Pa.**

WATER PROOF JET DRESSING FOR
Automobile Tops. Will color the top black
and also make it water proof. Write us for
price. Autocape Top Co., 2334 Michigan
Ave., Chicago, Ill.

YOU CAN SAVE 50%

On your repair bills every year if you
equip your car with an

ENGINE PURIFIER.

Over 10,000 in use. Can be fitted to any
auto or motor boat in 15 minutes. Price,
\$2.00 prepaid.

Louis Plein & Co.,

2134 Washington Blvd., Chicago.

1 1/4" D NO. 3 RAYFIELD CARB., \$10.00;
one H. T. Eisemann Mag., \$15.00; one Na-
tional L. T. Mag. and Coll, \$15.00; one B
No. 3 Stromberg Carburetor, \$9.00; 60 h. p.
used Thomas motor, \$125.00. Pope-Toledo
parts for sale. Auto Salvage Co., 1436
Wabash Ave., Chicago, Ill.

\$55.00 BUYS A BRAND NEW "DEACO"
4 cyl. Electric Lighting and Ignition Sys-
tem; never been used. Address Box D 379,
c/o Motor Age.

Parts and Accessories WANTED

MAGNETOS WANTED: WILL PAY CASH
for new or used magnetos.

Pellet's Magneto Exchange,
1463 Michigan Ave., Chicago.

**WANTED—A SET OF CYLINDERS, SEC-
ond-hand, in good condition, for a Model
S. 1909 Pope-Hartford engine. J. H. Reagan,
Floydada, Tex.**

WANTED—CRANKCASE FOR ROYAL
Tourist 1908 Model, eight-passenger, sec-
ond-hand. We buy and sell second-hand
parts of any car; let us know your wants.
Polk Auto Shop, 1006 McInnis Ave., Hatties-
burg, Miss.

Cars Wanted

MY KINGDOM FOR A CAR
160 Acres fine Oklahoma land; level; soil
black loam; all fenced; house; at \$20.00 per
acre, worth more, but I want a car; what
have you in exchange?

A. L. Stone, Texline, Tex.

WANTED—AUTOS.

Will pay spot cash for 1912 King or Samp-
son car, 5-pass., if cheap. Box D 395, c/o
Motor Age, Chicago.

WANTED—EMPIRE, MODEL C 1911,
shaft-drive roadster. Give full particulars
and price in first letter. Owensville Light
Co., Owensville, Ind.

WILL BUY FOR CASH—FACTORY OVER- productions, obsolete and last year models. We are the mid-West's largest dealers in used cars. No deal too big. Tell us what you have. Mid-West Sales Co., 1820-22 Grand Ave., Kansas City, Mo.

Ball Bearings

BALL & ROLLER BEARINGS, ALL TYPES

Distributors of
"F & S" Ball Bearings.
"New Departure" Ball Bearings.
"Pressed Steel" Ball Bearings.
"Standard" Ball and Roller Bearings.
BALL BEARINGS REPAIRED.
THE GWILLIAM COMPANY.
New York—Broadway, at 58th St.
Philadelphia—1314 Arch St.

Situations Wanted

ADVERTISING OR PUBLICITY MAN- ager. Technical graduate. Five years' experience in automobile work. Competent executive. Address Box D 396, c/o Motor Age, Chicago. p

ENGINEER HAS HAD 8 YEARS' EXPE- rience in the design of pleasure and commercial cars; is open for engagement. Box D 341, c/o Motor Age. s

I WANT TO CONNECT WITH SOME GOOD square firm, as branch manager, road salesman or sales manager. Salary and commission or a percent of the profits. Six years' experience selling automobiles. Address, Box D 357, c/o Motor Age. k

POSITION WANTED AS CHAUFFEUR repair man or salesman. I am a graduate of the practical auto school, but have not had much experience. Address Luey Lamb, New Boston, Ill.

SALESMAN OF EIGHT YEARS OF EXPE- rience and of wide acquaintance desires to make connection with a live firm where experience and hard work will be appreciated. Until recently was employed by firm manufacturing medium-priced car as assistant sales manager. Had best of reason for leaving their employ.

Can furnish best of references as to my ability and reliability. Address Box D 337, c/o Motor Age. r

SALESMAN OR BRANCH MANAGER Desires to connect with truck or pleasure car manufacturer. Twelve years' experience; a practical as well as technical man. Can produce results; best of references. Will accept reasonable proposition provided there is a future in sight. Address Box D 380, c/o Motor Age. e

SITUATION WANTED—IN AUTOMOBILE repair shop by steady young man (white), graduate of Correspondence School of Auto Construction. Everett Hemsley, Delta, Ia.

TRAVELING SALESMAN WISHES POSI- tion with Tire House or Automobile Manufacturer. Has had 20 years experience in tire business and 10 years in automobiles. Address Box D 388, c/o Motor Age. b

YOUNG MAN WHO IS A CAR OWNER and good driver wishes position as chauffeur for party touring Europe this summer. Willing to go without salary if expenses are paid. Address Box D 397, c/o Motor Age, Chicago. f

Help Wanted

DISTRICT MANAGERS WANTED FOR the Northwest, Pacific Coast, South and Southwest to represent a popular priced car of national distribution. Thorough knowledge of territorial conditions demanded. Only experienced men will be considered. Address, Box D 383, c/o Motor Age. h

ENGINEERS, SUPERINTENDENTS, Works Managers, Designers, Production and Efficiency Engineers, and Draftsmen with automobile experience. Inquiries confidential; record must stand investigation when desired. The Engineering Agency, Inc.—20th Year—Chicago.

TIRE EXPERT. If you are reliable, industrious, know tire repairing thoroughly, and want a permanent position, write Lahr Motor Sales Co., Bismarck, N. D.

WANTED—A FIRST CLASS FIELD MAN for Motor Trucks. Must show a record for producing business and give references in first letter. All communications confidential. Address Box D 398, c/o Motor Age. d

WANTED—PURCHASING AGENT WITH experience; must know the market thoroughly. Factory located in New York City, producing modern six cylinder car. Box 48, Larchmont, N. Y. p

45 HIGH GRADE MEN WANTED For all lines of the automobile industry. The Toledo Engineering Agency, Toledo, O. H. L. Croy, M. E., Mgr. Member S. A. E.

Salesmen Wanted

SPECIALTY SALESMEN AND AGENTS. See our notice elsewhere in this issue. You can make big money selling the Parsons' Gasoline Saver because it really SAVES. Every owner of a car, motor boat or stationary motor is an interested prospect. The Parsons Mfg. Co., Toledo, Ohio. m

WANTED—A REAL LIVE SALESMAN for an inside position, in an auto accessory and tire jobbing house. Must have previous experience in that line and be a real hustler. Not a very large salary to start, but a Darn good chance if you make good. Address Box D 399, c/o Motor Age.



Good Results

"Enclosed find check in payment for advertising in MOTOR AGE, two insertions. We have had good results from this ad and you will herewith find enclosed copy for six more insertions." A. H. Y.

Agency Wanted

AGENCIES WANTED.

We are open to take up agencies for good selling lines of anything in motor car novelties.

We have excellent standing among the trade and auto users and are equipped to distribute any article of merit. Our customers are spread over every state in the Union. Keaton Patents Co., U. S. Rubber Bldg., New York.

PROGRESSIVE CONCERN MANUFACTURING full line of rubber stocks for Tire Repairmen wants responsible and active sales agents in Chicago for an exclusive western territory. References required. Address Box D 387, c/o Motor Age. s

STODDARD-DAYTON AGENCY PROPOSITION

The new Stoddard-Dayton automobiles are now distributed direct from the factory. The best and fairest agency offer ever written is now ready for representatives in every locality. The 1913 line includes roadsters, touring and closed body cars, ranging in price from \$1,350 to \$5,000. Write at once for our liberal offer. State territory desired. The Stoddard-Dayton Sales Co., Dayton, Ohio.

WANTED.

Agency for an automobile truck and auto manufacturer that will furnish demonstrator to agent. Thos. J. McEvoy, New Orleans, La.

Business Opportunities

ATTENTION

The Toledo Automobile Devices Co., of Toledo, Ohio, having all it can do to take care of its own patent accessories, offers for sale a couple of valuable patent devices, suitable for manufacturing on a small or large scale, showing several hundred per cent profit. For particulars address

THE TAD COMPANY,
Toledo, Ohio.

FOR SALE: AN IDEAL FACTORY, SUIT- able for furniture, automobile or piano manufacturing, within one and one-half hour of Detroit, Michigan, on the Grand Trunk and Pere Marquette Railroads. Brick and heavy mill construction. Perfect sprinkler system, and fully equipped with mill machinery. Nothing better in the country. For full particulars write to E. J. H., 25 Jewett Avenue, Buffalo, N. Y. c

FOR SALE—A WELL ESTABLISHED, leading taxicab business at a bargain, if taken at once. Located in a city of 140,000 in southern Ohio. Owner desires to sell because of other business interests requiring his time. Will sell for part cash and weekly payments. A chance for the right man. Will clear \$5,000 a year after deducting depreciation and all expenses. Write for particulars. Address Taxicab Company, c/o Motor Age, 910 Michigan Ave., Chicago. s

FOR SALE—A WELL EQUIPPED GARAGE in a town of 6,000, located in Southern New Mexico, on Borderland Route, with a good machine shop, trade and livery business. Will invoice about \$5,000. Address Box D 389, c/o Motor Age. b

FOR SALE—GROWING VULCANIZING and bicycle business in southern Wisconsin town of 18,000. Box D 390, c/o Motor Age. p

FOR SALE—HAYWOOD VULCANIZER, Model H. Used three months. Perfect condition. Price low. Box D 335, c/o Motor Age. p

FOR SALE—THE FINEST EQUIPPED and most up to date vulcanizing shop in northern Illinois, including motor cycle agency, accessories, tires, etc. City of 35,000; no competition. Large outside territory to draw from. A splendid growing business. Must sell at once; leaving city. Address Box D 372, c/o Motor Age. g

GARAGE AND REPAIR SHOP FOR SALE. Located in best city in Oklahoma; doing a big business. Ill health reason for selling. Box D 375, c/o Motor Age. d

Magnetos

MAGNETOS

Repaired, remagnetized; prompt service on all makes.

Get our exchange proposition on new K-W for old equipment.

Spark Coil, Storage Battery and Carburetor Repairs.

Northwestern distributors.

K-W magnetos, Schebler carburetors, Vesta lighting equipments.

Kellogg Self Starters and Tire Inflators
Reinhard Brothers Co.,
Minneapolis, Minn.

Tires

DON'T READ THIS

Unless you are interested in the purchase of new and slightly used tires at special prices.

A splendid line of lamps at prices that will interest you.

Monarch Tire & Repair Co.,
1151 Wabash Ave., Chicago. Phone Har. 1440.

ENGLEBERT TYRES.

Made in Belgium.

Standard in all sizes. Guaranteed 4,000 miles.

NEW AND SECOND-HAND TIRES AT A GREAT REDUCTION.
SEND FOR CIRCULAR ON REPAIR WORK.
Colonial Rubber Works,
46-52 E. 28th St., Chicago.

NON-SKID TIRES.

I have just purchased a quantity of high grade standard non-skid seconds.

Every tire in this lot was originally made to carry the manufacturer's guarantee for 3,500 miles. The wearing qualities are not affected in any manner and will positively give equal service to any guaranteed tire of the same make; each and every tire bears the manufacturer's name and size.

The following prices offer you a great saving with the opportunity of buying one of the best brands in the market.

Size.	Price.	Size.	Price.
30x3 1/2.....	\$14.50	36x4.....	\$24.50
32x3 1/2.....	16.00	34x4 1/2.....	27.00
30x4.....	17.50	35x4 1/2.....	28.00
32x4.....	20.00	36x4 1/2.....	29.00
33x4.....	21.50	35x5.....	30.00
34x4.....	22.50	36x5.....	31.50
35x4.....	23.00	37x5.....	32.50

I do not carry any but standard make tires, or deal in inferior brands.

I will ship any size tire listed above to any part of the U. S. upon receipt of 10% of order, balance C. O. D. All goods sent with privilege of examination.

M. C. Moran,
334 Amsterdam Ave., N. Y. City.

TIRES.

We are the largest jobbers in Tubes and Tires, at Cut Rate Prices.

All Fresh Goods. A few special bargains:

Size.	Casings.	Tubes.
30 x 3	\$ 7.65	\$2.35
30 x 3 1/2	11.00	3.20
32 x 3 1/2	12.00	3.35
34 x 3 1/2	12.90	3.55
33 x 4	16.00	4.60
34 x 4	17.25	4.65
35 x 4	17.50	4.80
36 x 4 1/2	21.50	6.25

Other sizes in proportion.

Send 10% for express charges, bal. C. O. D.

Allow Examination.
MANUFACTURERS AUTO TIRE CO.
1427 Michigan Ave., Chicago.

TIRES TIRES

I will sell you good wrapped tread clincher tires cheaper than any one in the United States. New 1913 stock. Write for prices.

D. Ogden,
Columbus, Ind.

Size.	Our Price.	Size.	Our Price.
	1-3 off list.		1/2 off list.
32x4	\$15.00	36x4 1/2.....	\$23.00
34x4	17.00	36x5	27.00
34x4 1/2	19.00	37x5	29.00
36x4	18.00		

10% with order; bal. C. O. D. Dept. M.
Lake Shore Tire Co.,
120-124 E. Ontario St., Chicago.

800—TIRES—800

One-half price; new and slightly used; 1912 stock just received from manufacturers in Akron, Ohio. All stock must be sold to make room.

Serlin Tire Co.,
1073 14th Place, Chicago.
Phone, Canal 2191.

Portable Garages

PINYOUN'S PORTABLE GARAGES.

Built to last.

These are not light, flimsy structures, but solid, substantial, stylish garages that are guaranteed to give years of service & satisfaction. Descriptive literature for the asking.

F. C. Pinyoun & Son,
2530 Carnegie Ave., Cleveland, Ohio.

Rebuilding and Repairing

AUTOMOBILE CYLINDERS REGROUND, new pistons and rings fitted. Garage Air Compressors. Cast Iron Brazing Co., Manchester, N. H.

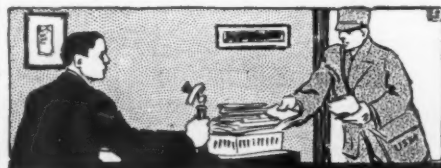
CYLINDERS REGROUND AND FITTED with new pistons and rings, from \$7 to \$11 per cylinder. Gear cutting in steel, brass, rawhide, fiber, etc. Send us your old parts and we will make you new ones like originals, often cheaper than you can get them from the manufacturer. The Crown Machine Shop, Crown Point, Ind.

BROKEN CYLINDERS AND CRANK- cases—send them to be made good as new at fraction of replacement cost. Scored cylinders repaired, \$12. No new pistons and rings required because bore not enlarged. Where cylinders are worn (not scored from loose wrist pin) reboring is only remedy. We do it expertly. Write for complete information and estimates. Waterbury Welding Company, Waterbury, Conn.

CYLINDERS REGROUND, NEW PISTONS

and rings fitted, gear cutting, of all kinds and materials, transmission and bevel gears, piston pins and push rods of chrome nickel steel hardened, tempered and ground; guaranteed better than factory; old piston pins reground and fitted to your new pistons; old push rods reground and furnished with new guides, crank shafts, connecting rods, valves, crank cases; any part for your auto or motor reproduced same as original but better; phosphor bronze bushings carried in stock. Send old or broken parts to go by. The shop of quality.

McCadden Machine Works,
St. Cloud, Minn.



Positions Filled

"I have filled the positions referred to, and have received numerous applications, so discontinue the ad. Rest assured that when we need additional salesmen, we will take pleasure in giving you the advertisement."

E. H. C.

CYLINDERS REGROUND

and fitted with new pistons and rings for \$15 per cylinder. We make parts and cut gears of all kinds. Send us your old parts and we will repair or duplicate them in record time. Cracked cylinders, gear cases, etc., welded and made good as new. Aluminum, bronze and brass castings of every description. The Adapt Machinery Co., 1624 Wabash Ave., Chicago, Ill.

THE FIXIT WINDSHIELD CO.

Expert repairers and reglazing of all kinds. All work guaranteed. A trial will convince you. 1919 S. Wabash Ave., Chicago. Phone Calumet 4583.

WANTED

Stoddard-Dayton (model O) parts for repairing. J. F. Adams, Hazel Dell, Ill.

Radiator and Lamp Repairing

A-A-A RADIATORS MANUFACTURED and repaired. Radiators of any make repaired and returned same day. We can make any style radiator and ship in three days. Sheppard Co., 1331 Jackson Blvd., Chicago.

ILLINOIS AUTO SHEET METAL WORKS, 58-60 E. 16th St., Chicago, Ill. Manufacturers and repairers of Radiators, Hoods, Fenders, Tanks, etc. Cores built in old radiators. We do expert repairing, at lowest price. Calumet 1191.

ALL KINDS OF AUTO RADIATORS, hoods, fenders, lamps and windshields, etc., rebuilt and repaired. All work guaranteed. Also general sheet metal work. Phone or mail order. L. Blumenfeld & Co., 1919 Wabash Ave., Chicago. Tel. Cal. 4583.

AA1 AUTO LAMP REPAIRING

All Radiators Repaired by expert workmen. All work guaranteed by the Michaud Metal Works, 1615 Wabash Ave., Chicago. Tel. Cal. 5236; Auto 67-337.

ARROW RADIATOR REPAIR CO.

1331 Wabash Ave., Chicago. Expert repair work on Radiators, Hoods, Fenders, Dashes, Tanks and Drip Pans. We guarantee all our work. Phone Cal. 1995.

CHICAGO MANUFACTURING COMPANY,

1466 Michigan Ave., Chicago. Manufacturers of Radiators, Hoods, Fenders and Tanks. New Cores placed in old radiators. First-class repairing. All work guaranteed.

DON'T READ THIS

Unless you want the best Radiator repairing to be had at popular prices.

ALL WORK IS STRICTLY GUARANTEED.

All we ask is a trial.

E. B. Schaeffer,
2213-17 Michigan Ave., Chicago.

ONLY RADIATOR FACTORY IN NORTH- west. Eleven years' knowing how. Why send your Radiator down East when you can ship it to us; save Time, Express, Freight, Money, and get best workmanship. Prices right. Make new Radiators; allow for old one.

Todd Manufacturing Co.,
820-822-824 Mary Pl., Minneapolis, Minn.

RADIATOR AND ALL METAL REPAIRING QUICKLY DONE.

Repairs to Radiators, Hoods, Fenders, etc., our specialty. Best workmanship. If in a hurry for your car, try us. Quick and satisfactory service guaranteed.

Auto Combination M'tg Co.,
1467-69 Michigan Ave.,
Chicago.

Phone Calumet 3433.

RADIATORS REPAIRED EXCLUSIVELY—

Facilities enable us to specialize in this branch of repairing so that all work is strictly guaranteed. Further comment is unnecessary. A trial will convince you.

Erickson & Johnson,
2224-6 Cottage Grove Ave., Chicago.
Phone Calumet 2226.

RADIATOR REPAIRS.

Quick Service. Low Prices.
Work Guaranteed.
Tennant Motor Limited,
2447 Michigan Avenue,
Chicago.

THE M. & L. AUTO SHEET METAL

Works rebuild and repair radiators, hoods, fenders, tanks, lamps, etc.
1551 Michigan Ave., Chicago, Ill.
Tel. Cal. 2348.

Welding

AMERICAN WELDING CO.,

2637 Michigan Ave., Chicago. Autogenous welding of all metals, such as crankcases, cylinders, etc. We positively guarantee all work. Tel. Calumet 3563.

BRAZING AND WELDING CO.

of Chicago. All metals brazed and welded are guaranteed. Experts in aluminum welding. Send for circular on aluminum welding. 1615 Wabash Ave., Tel. Calumet 5286.

BROKEN CRANKSHAFTS, CRANKCASES, cylinders, flywheels, gearchests, pistons, perfectly welded and machined, ready to replace. Scored cylinders made new. Booklet. Atlas Welding Works, Rahway, N. J.

WELDING—CYLINDER CRANKCASE AND Crankshaft Welded. Cylinders rebored, \$7.00 to \$11.00 a cylinder, including piston, 8 rings. Sterling Engine Company, 331-333 S. Clinton St., Chicago, Ill.

WELDING

Cast iron, aluminum and all metals. National Welding & Mfg. Co., Inc.,
523 Jackson Blvd., Chicago, Ill.

WE WELD AND ABSOLUTELY

Guarantee our welds to hold, cylinders (cracked in or outside), crankshafts, aluminum crankcases, transmission cases, housings, etc., by the Ox-weld process of welding and cutting metals. Estimates furnished for job or repair welding and cutting operations of all kinds. Ox-weld Acetylene Co., 37th St. and Jasper Pl., Chicago, Illinois. Downtown receiving station, 557-561 W. Jackson Blvd.

Patent Attorneys

ATTENTION—PATENT YOUR INVENTION
Free search and opinion. Send for inventor's Primer free. Milo B. Stevens & Co., 812 S. Dearborn St., Chicago. Established 1864. Main office, Washington.

C. L. PARKER, PATENT ATTORNEY,
Formerly member Examining Corps, U. S. Patent Office, 960 G St., Washington, D. C. Pamphlet of instruction sent upon request.

Automobile Schools

ACADEMY OF AUTOMOBILE ENGINEERING—\$35 pays for complete unlimited course on automobiles. Actual repair work and road lessons daily. Best equipped school and shop in Chicago. Evening classes also. Call or write, 1454 S. Michigan Ave., Chicago.

AA1 IS HOW OUR STUDENTS STAND with auto owners. Our school is the oldest, best equipped, most practical and successful in America. Write, phone or call for particulars. Auto School of America, Dept. M, 1600 Mich. Ave., Chicago. Tel. 1088 Cal.

AUTOMOBILE INSTRUCTIONS
Send for catalogue of the best equipped and most prominent institution in the country.
WOLVERINE AUTOMOBILE COLLEGE
940-2 Jefferson Ave. Detroit, Mich.

GREER COLLEGE OF MOTORING
Opposite Coliseum, 1459 Wabash Ave., Chicago. A practical education; 100 automobiles, 2 entire floors, 8 instructors; day and evening classes. Free booklet. Phone Calumet 327.

RELIABLE AUTOMOBILE SCHOOL

If you only want to learn to drive a car or to take a car to pieces or to clean up dirty parts, don't come to my school.
But if you want to learn the Automobile Construction in all its phases thoroughly, then come to the Reliable School.

THE F. E. EDWARDS AUTOMOBILE SCHOOL,

1427 Wabash Ave., Chicago.

Automobile Books and Maps for Motorists

A BOOK ON WHITE STEAMERS, GIVING full instructions regarding all troubles and adjustments. Eleven chapters, six charts. Send \$1.00 with order; if not satisfactory return at once and get your money back. E. C. Wescott, 4245 Kenmore Ave., Chicago, Ill.

A. L. DYKE'S AUTO INSTRUCTION—A new idea of instructing you to run and repair automobiles at home with working models (from London), charts, etc. Indorsed by Duryea, Oldfield, Splittorf. Send for free 32-page illustrated and interesting book. A. L. Dyke, Box 16, Roe Bldg., St. Louis, Mo.

GAS ENGINE TROUBLES AND INSTALLATION. Cloth, \$1.00; flexible leather, \$1.50. Automobile Troubles and How to Remedy Them. Cloth, \$1.00; leather, \$1.50. Ten other practical and reliable mechanical books. Send for circular.

Charles C. Thompson Co.,
1128 S. Wabash Ave., Chicago.

PARTS AND ACCESSORY MAKERS

The motorcycle field is well worth your attention; 75,000 new machines in 1912. Leading medium Motorcycle illustrated, 51 Chambers St., New York City. Paid circulation over 8,600.

THE FORD MODEL T REFERENCE BOOK "is real money to its owner. I have had it but a short time and have saved money by referring to it many times. It is a Ford Encyclopedia and no one can buy it of me for five times its price. Push it for the owner's benefit." This is a genuine unsolicited testimonial of a New York man. Original shown on request. Send for descriptive circular, or sent post paid \$1.00. Ford Reference Book Co., 57 West 125th Street, New York.

Insurance

AUTOMOBILES INSURED AGAINST FIRE, theft, collision and liability. Covers anywhere. Old line company—lowest rates. Alfons E. Bahr, 1929 Insurance Exchange, Chicago.

Mailing Lists

AUTOMOBILE MAILING LISTS

13,191 Automobile Dealers	\$25.00
9,627 " Garages	20.00
5,681 " Repairs	12.50
3,541 " Supplies	10.00

Neatly typewritten, showing Financial Rating in dollars of each one, alphabetically by States and Towns, 1913 compilation.

Ask for certain States if you do not want all.

877,000 Automobile Owners, by States. Price on application.

Ask for our "Silent Salesman," showing 2,000 other lists, etc.
Send check with order.

TRADE CIRCULAR ADDRESSING CO.,
166 West Adams Street,
Chicago.

Established 1880 Phone Franklin 1183

AUTOMOBILE LISTS OF OWNERS, DEALERS, etc.; any state. Auto Directories Co., 1717 Broadway, New York City.

AUTOMOBILE ADDRESSING AND MAILING lists; card systems; any section, any make. Auto List & Addressing Co., Buick Bldg., New York City, N. Y.

NEW ENGLAND AUTO LIST AND TOURIST includes weekly list of all N. E. Auto Owners, Garages, Dealers, etc., with maps. Selected N. E. routes and motor news, \$10.00 yearly. 138 Pearl St., Boston, Mass.

Hotels

HOTEL WYCHMERE, EUROPEAN,
Indiana Ave. and Eighteenth St., Chicago, in the very center of the automobile district; 75c to \$1.50 per day; with bath, \$1.00 to \$2.00. Clean, comfortable rooms. Fine 40c table d'hôte. Take South Side trolley to door.

Why Not Sell It?

That used car can be used to advantage by others. They will be glad to have it if you will just tell them where you are.

This is the season of year in which the demand for motor cars, new and second hand, grows every day.

An advertisement inserted under "Cars for Sale" in MOTOR AGE classified columns will bring quick returns on your money.

Don't Forget

Our next issue will contain full report of the

Indianapolis Races

Has your advertisement been sent to us?

Forms Close
Monday, June 2d

LOOK OVER THE Classified Ads on pages

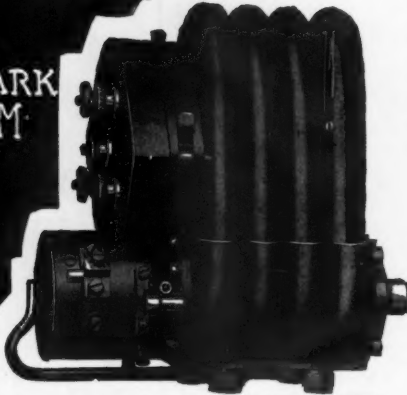
Send in your orders to list YOUR wants there and then

watch the results

132 to 137 Inclusive

HECO-Magnetos

INSURE
A STEADY SPARK
AT ANY R.P.M.



HECO MAGNETOS are the product of experts specialized in the electrical business. They embody all that the electrical industry knows about magnetos.

By our special method of winding the secondaries we are able to positively guarantee them against burning out or breaking down.

HECO MAGNETOS supply a spark of equal intensity for any number of revolutions per minute.

We also make the well-known HECO COILS, and HECO COMBINATION PRIMERS and SPARK PLUGS. Let us send you our complete catalog.

HEINZE ELECTRIC COMPANY

Factories and General Office, Lowell, Mass.
Sales Office, Detroit, Mich.

59 F



Golden Star Body Polish

A few drops of Golden Star Automobile Body Polish on the dust cloth will keep your car looking new and clean—its surface always shining with mirror-like brightness. Keeps your windshield clear in fog or rainy weather.

Renews and maintains the factory finish

Positively cannot dull or injure in the slightest degree the most glossy, delicate finish, as it contains no acid, alkali or grit.

Always ready for use. Your dealer will supply you.

R. W. MORRIS
MFG. CO., Inc.
Kansas
City,
Mo.

FREE
SAMPLE

Let us prove the merits of Golden Star, "The World's Best Cleaner and Polisher." Ask your dealer for a free sample or write us and it will be sent you at once.



Index to Advertisements

A

Adams-Bagnall Electric Co.	87
Aermore Mfg. Co.	123
Ajax-Grieb Rubber Co.	85
American Ball Bearing Co.	72
American Electric Co.	114
American Motors Co.	89 to 92
Ames Motor Co.	123
Approved Auto Specialties Co.	112
Atwater-Kent Mfg. Works	64
Auburn Automobile Co.	131
Automobile Supply Mfg. Co.	117

B

Badger Brass Mfg. Co.	122
Baker Motor Veh. Co.	75
Barthel & Daly	124
Bartholomew Co.	104
Beach, T. C., Auto Turn Table Co.	129
Beaver Mfg. Co.	117
Beckley-Ralston Co.	129
Benton, L. F., Co.	119
Billings & Spencer Co.	107
Borland-Grannis Co.	124
Bosch Magneto Co.	3
Bowser, S. F., & Co.	109
Braender Rubber & Tire Co.	119
Brennan Motor Mfg. Co.	119
Bricton Mfg. Co.	129
Bridgeport Brass Co.	114
Briggs-Detroit Co.	131
Broderick & Bascom Rope Co.	111
Brown Co.	104
Brown Commercial Car Co.	81
Buckeye Mfg. Co.	120
Buda Co.	126
Buob & Scheu	129
Byrne, Kingston & Co.	101

C

Cartercar Co.	124
Central Brass & Fixture Co.	112
Chandler Motor Car Co.	65 to 68
Chase Motor Truck Co.	124
Chicago Automobile Supply House	129
Classified	132-133-134-135-136-137
Class Journal	56
Cleveland-Canton Spring Co.	124
Cole Motor Car Co.	124
Connecticut Telephone Electric Co.	121
Continental Motor Mfg. Co.	95
Corcoran Lamp Co.	127
Covert Motor Vehicle Co.	98
Cullman Wheel Co.	129
Cutting Motor Car Co.	119

D

Daniels, Smalley	129
Dart Motor Mfg. Co.	118
Dean Electric Co.	119
De Soto Motor Car Co.	120
Detroit Mechanical Starter Co.	116
Diamond Rubber Co. of N. Y.	98
Dixon, Joseph, Crucible Co.	118
Dorris Motor Car Co.	125
Double Fabric Tire Co.	114

E

Eagle Oil & Supply Co.	116
Elsemann Magneto Co.	123
Electrical Specialties Mfg. Co.	131
Empire China Works	109
Esterline Co.	69

F

F. I. A. T.	114
Fisher Electric Co.	73
Foos Gas Engine Co.	111
Ford Motor Co.	121

G

Gabriel Horn Mfg. Co.	105
Gibney, James L., & Bro.	124
Gilbert Mfg. Co.	113
Gilmer, G. Walker, Jr.	117
Golde-Patent Mfg. Co.	122
Goodyear Tire & Rubber Co.	117
Gould Storage Battery Co.	106
Gray & Davis	4
Gray-Dexter & Co.	107
Great Western Automobile Co.	118
Greenslade Oil Co.	116
Grossman, Emil, Co.	58
Guide Motor Lamp Mfg. Co.	114

H

Halliwell Co.	131
Hartford Suspension Co.	2
Hayes Mfg. Co.	114
Haynes Automobile Co.	114
Haywood Tire & Equipment Co.	128
Heinze Electric Co.	138
Henderson Motor Car Co.	116
Herreshoff Motor Co.	126
Herz & Co.	111
Hess Spring & Axle Co.	118
Hoffecker Co.	117
Hollenden Hotel Co.	108
Holley Bros. Co.	57
Hotel La Salle	109
Hotel Woodstock	127
Houk, Geo. W., Co.	Cover
Hoyt Electrical Instrument Works	113
Hupp Motor Car Co.	93
Hyatt Roller Bearings Co.	122

I

Ideal Steel Wheel Co.	125
Imperial Automobile Co.	116
Ingersoll-Rand Co.	123
Inter-State Automobile Co.	121
Invader Oil Co.	62-63

J

J. H. Tonneau Shield Co.	109
Jackson Automobile Co.	122
Jenkins Mfg. Co.	126
Johns, H. W.-Manville Co.	113
Johnson Service Co.	110
Jones Electric Starter Co.	77 to 80
Jones Speedometer Co.	115

K

K-W Ignition Co.	96
Keeton Motor Co.	Back Cover
Kelly-Springfield Motor Truck Co.	94
Kimball Tire Case Co.	118
Kinsey Mfg. Co.	126
Kissel Motor Car Co.	127
Kline Motor Car Corp.	117
Knox Automobile Co.	119
Koehler, H. J., S. G. Co.	82

Index to Advertisements

L

Lauth-Juergens Motor Car Co. 123
 Lovell-McConnell Mfg. Co. 53
 Lozier Motor Car Co. 131

M

McCue Co. 128
 McFarlan Motor Car Co. 120
 Marathon Motor Works. 125
 Marburg Bros., Inc. 119
 Marlon Motor Car Co. 115
 Maxwell Motor Co. 127
 Mayer Carburetor Co. 118
 Mayo Mfg. Co. Cover
 Mayo Radiator Co. 139
 Mercer Automobile Co. 117
 Merchant & Evans Co. 131
 Metal Products Co. 71
 Metal Specialties Mfg. Co. 103
 Meteor Motor Car Co. 60-61
 Metz Co. 118
 Michener, E. S. 127
 Michigan Motor Car Co. 121
 Milwaukee Motor Co. 106
 Model Gas Engine Works. 126
 Modern Auto Appliance Co. 129
 Moline Automobile Co. 115
 Morris, R. W., Mfg. Co. 138
 Mosler, A. R., & Co. 115
 Motometer Co. 128
 Motor Car Equipment Co. 125
 Motor Car Supply Co. 129
 Mutty, L. J., Co. 129

N

National Motor Supply Co. 129
 National Motor Vehicle Co. 54
 New Departure Mfg. Co. 100
 New York & New Jersey Lubricant Co. 121
 Nordyke & Marmon Co. 125
 Norma, The, Co. of Am. 115
 North East Electric Co. 1
 Nyberg Automobile Works. 127

O

Oakland Motor Car Co. 128
 Old Dutch Cleanser. 110
 Owen, R. M., & Co. 115

P

Packard Motor Car Co. 140
 Paige-Detroit Motor Car Co. 121
 Pathfinder, The, Co. 121
 Peacock, Clarence N., & Co. 122
 Pennsylvania Rubber Co. 99
 Pilot Car Sales Co. 115
 Pittsfield Spark Coil Co. 128
 Premier Mfg. Co. 112
 Premier Motor Mfg. Co. 115
 Prest-O-Lite Co. 125
 Price Fire & Waterproofing Co. 128
 Prosser, Thos., & Son. 119
 Pullman Motor Car Co. 126

R

R. C. H. Corp. 86
 R. I. V. Co. 129
 Rayfield Carburetor Co. 124
 Remy Electric Co. 112
 Republic Rubber Co. 123
 Rhineland Machine Works Co. 127
 Royal Equipment Co. 121
 Rutenber Motor Co. 118

S

Schacht Motor Car Co. 125
 Schoen-Jackson Co. 129
 Schrader's, A. Sons. 129
 Searchlight Gas Co. 120
 Selden Truck Sales Co. 103
 Shaler, C. A., Co. 105
 Sheldon Axle Co. 120
 Simms Magneto Co. 84
 Sparks-Withington Co. 128
 Speedwell Motor Car Co. 70
 Spicer Mfg. Co. 116
 Splittdorf Electrical Co. 102
 Spring Leaf Lubricator Co. 139
 Standard, The, Co. 116
 Standard Oil Co. 129
 Star Ball Retainer Co. 122
 Stewart Speedometer Factory. 59
 Stromberg Motor Devices Co. 51
 Stutz Motor Car Co. 111
 Suspension Roller Bearing Co. 117
 Swinehart Tire & Rubber Co. 120

T

Tarrytown Motor Car Co. 83
 Times Square Auto Co. 122
 Timken-Detroit Axle Co. 127
 Timken Roller Bearing Co. 127
 Trumbley Auto Top & Equipment Co. 129
 Tuthill Spring Co. 129
 Twitchell Gauge Co. 123
 Twentieth Century Motor Car Supply Co. 129

U

U. S. Light & Heating. 113
 United States Tire Co. 125
 United Steel Co. 110
 Universal Tire Protector Co. 102

V

Vacuum Oil Co. 74
 Veeder Mfg. Co. 110

W

Wadhams Oil Co. 108
 Waltham Watch Co. 117
 Ward Leonard Electric Co. 88
 Warner Gear Co. 100
 Warner Mfg. Co. 123
 Weed Chain Tire Grip Co. 126
 Wells, H. C., Mfg. Co. 76
 Western Tire & Rubber Co. 108
 Weston Electrical Inst. Co. 108
 Weston-Mott Co. 116
 Wheeler & Schebler. 52
 Willard Storage Battery. 55
 Willys-Overland Co. 97
 Winton Motor Co. 122

Z

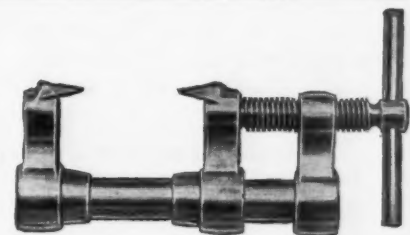
Zenith Carburetor Co. 120



We will not build a radiator in our factory that is not honestly and scientifically designed to do the work required of it. Our continued business relationship with the makers of America's best cars, year after year, offers abundant testimony of the soundness of this policy.

The Mayo Radiator Co.
 New Haven, Conn.

"STOPS
 Spring
 Squeaks"



Spring Leaf Lubricator

Why do the Cadillac Motor Car Company, of Detroit, include it in their 1913 equipment?

Can we produce any better evidence as to its usefulness?

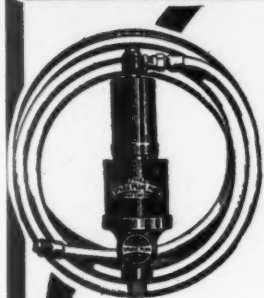
All right! It makes your car ride easier; it prevents your springs from rusting and squeaking—thus eliminating breaking; and, answers as a Repair Clamp, if you break a spring. Try your DEALER, if he doesn't handle it, send \$1.50 (check or money order) and we will send one prepaid to any part of the United States or Canada.

Money refunded, if not satisfied

SPRING LEAF LUBRICATOR CO.
 1004 Forest Avenue ANN ARBOR, MICH.

When Writing to Advertisers, Please Mention Motor Age.

"This Is Just Physical Torture"



It is physical torture because a hand pump makes the motorist work with it. A hand pump without 2 strong arms and a strong back behind it is nothing but a useless piece of tubing with a piston in it. The purchase of a hand pump is an agreement on the part of the motorist who buys it to blister his hands, to stream perspiration, to strain his back, waste his time, and spoil his motoring pleasure.



MAYO *SPARK* PLUG PUMP

THE MAYO SPARK PLUG PUMP, when it comes to inflating tires, lets the motorist out. It pumps tires for, not with him. It uses the motor's muscles—permits him to save his. He can sit on the running-board and watch the motor do the work, 5 times faster than he could with a back-racking hand pump. And his wife can pump tires as well as he.

Some motorists still consider a hand pump an economy because of its low initial cost. Apply to the cost of a MAYO what you would ordinarily pay for a good hand pump. Use the MAYO and it will make up the difference by paying for itself in the physical discomfort it saves you.

The MAYO is instantly attached by substituting it for any spark plug. It pumps nothing but pure, fresh air. Inflates the largest tire in from 2 to 4 minutes. Built with metal rings like your motor and will last as long. Adaptable to all size cars from the smallest FORD to the largest LOZIER. An occasional drop of oil is the only attention it ever requires. Weight, 2½ pounds. Fits nicely into the tool box. Complete with 12 feet of hose and connections.

PRICE \$10. Pressure Gauge \$2 Extra

MAYO MANUFACTURING CO., 55 E. 18th St., Chicago, Ill.

You
can use
this pump
FREE on your
car for 30 days
before purchasing.

Write for particulars.



This Is Just Perfect Comfort

KEETON

THE Distinction in Beauty—Comfort in Use and Lasting Endurance of the "Six-48" Keeton are immediately recognized by discriminating buyers of motor cars as representing the "finer points" of European design in which have been embodied the practical and economical American methods of manufacture.

Literature describing this "distinctively different" Six at \$3250 will be sent on request.

Keeton Motor Company
461 Lawton Ave., Detroit, Michigan

